Global Health Activities

Annual Report for FY 1998

National Center for Environmental Health

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

A report on the global activities undertaken by the National Center for Environmental Health during Fiscal Year 1998. Prepared by the Office of the Associate Director for Global Health, NCEH of the Centers for Disease Control and Prevention.

For further information, you may contact:
The Office of the Associate Director for Global Health
National Center for Environmental Health
Centers for Disease Control and Prevention
4770 Buford Highway, Mailstop F-29
Atlanta, GA 30341-3724
or call:
770-488-7231 or 770-488-4859
email:
<<mym5@cdc.gov>> or <<wbt8@cdc.gov>>

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FY 1998 NCEH Global Health Activities Executive Summary

Health related to the environment and to human development is important, both in the United States and around the world. The globalization of public health and of environmental concerns and the need to work with partners outside the health sector pose both challenges and opportunities for our nation. U.S. citizens are at risk from environmental health hazards in other countries. Exposure can occur either overseas (e.g., through tourism, military service) or at home (e.g., through the importation of contaminated products, air pollution). However, environmental factors cause much greater loss of life and health in some parts of the world than in the United States. Applying our knowledge about environmental health overseas may have a large impact on global health in the future. Furthermore, the United States may apply knowledge from other countries to benefit the public's health in this country. Environmental problems are often complex, costly, and controversial. Resolving them requires creativity, persistence, and an appreciation for the environmental, social, commercial, economic, and political factors at work in our changing world. Incorporating human health concerns explicitly into environmental policy making is critical to the future well being of all the world's people.

As part of the Centers for Disease Control and Prevention (CDC), the National Center for Environmental Health (NCEH) plays a lead role in ensuring the health of the United States, with a primarily domestic mandate. However, CDC's vision is Healthy People in a Healthy World, Through Prevention. Because the resources of NCEH to engage in global activities are limited, we must prioritize the Center's global activities and focus on those priorities that 1) are pressing global health problems, 2) fit into CDC's public health niche, and 3) can be addressed using NCEH's strengths. During FY 1998, we developed a new strategic global plan to identify the most important priorities and to focus the Center's global activities. Consistent with CDC's overall approach to global health, NCEH's goal is to work with partners to improve global health. In 1998, the Office of the Associate Director for Global Health was established at NCEH to help identify its global priorities and to help coordinate its actions concerning the identified priorities.

We identified five main global priorities, as well as several other global priorities that we anticipate will attain greater visibility and priority over the next few years. The five main priorities are: childhood lead poisoning; water, sanitation, and hygiene; urban health and megacities; micronutrient malnutrition; and emergency preparedness and response. In addition to the five main global priorities, our other priorities include: pesticides; birth defects–etiology and prevention; genetics and disease prevention–gene-environment interaction; child development; disabilities and health (including landmines); and radiation (beyond emergencies). We will use several strategic approaches to address these priorities, with a particular focus on evidence-based public health actions and the tools and systems necessary to support these: surveillance, assessment, and policy and research.

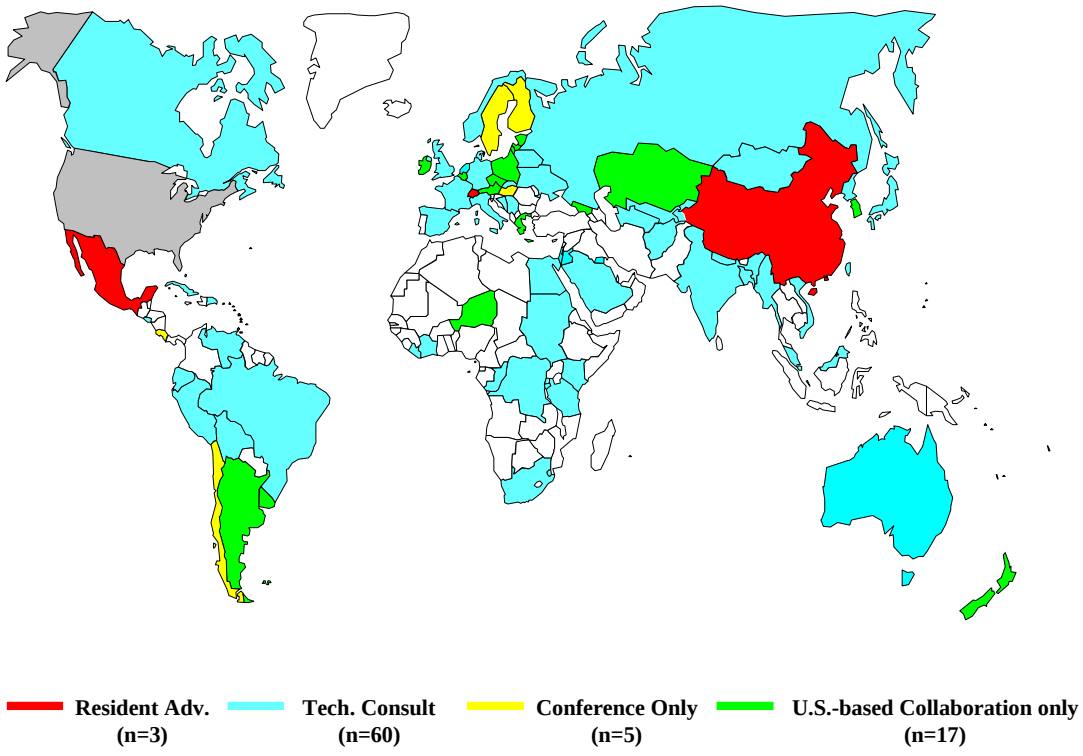
The key to the global agendas of CDC and NCEH is strategic partnerships. We will actively engage with key partners in helping to address our global priorities. Our strategic partners include United Nations (UN) agencies (e.g. World Health Organization [WHO], Pan American Health Organization [PAHO], United Nations Children's Fund [UNICEF], World Bank, United

Nations High Commissioner for Refugees [UNHCR], United Nations Centre for Human Settlements [UNCHS]/Habitat, and the United Nations Foundation [UNF]); U.S. government agencies, (e.g. National Institutes of Health [NIH], Department of State [DOS], United States Agency for International Development [USAID], Peace Corps, Environmental Protection Agency [EPA], National Oceanic and Atmospheric Administration [NOAA]); foundations; academia; professional organizations; multinational businesses; the media, and the public.

Finally, we recognize the need to maximize impact per resource investment. In order to accomplish this, we must define outcomes and evaluate the impact of NCEH involvement. During FY 1998, NCEH developed a new evaluation typology, which strives to identify the five different types of impact that our involvement may have: 1) direct (in-country impact from NCEH's own field work); 2) leveraging (influence on resource allocation and programming of partners); 3) emulation (others use or adapt NCEH guidelines and/or programs as models for their own programs); 4) enabling (training or capacity building); and 5) domestic impact (the application of overseas experiences or information in the United States).

During FY 1998, NCEH collaborated with 82 different countries, investing approximately 36 person-years (8% of total personnel time) and addressing a broad range of health issues.

NCEH FY98 Global Activities



Subject	Africa	Americas	Asia & Pacific	Europe	Middle East	New Independent States	Global
Air Pollution				X			
Asthma			X	X			
Bioterrorism					X	X	
Birth Defects				X			X
Cholesterol &Related Lipids: Cholesterol Reference Methods		X	X	X			
Cholesterol &Related Lipids: Laboratory Standardization		X	X	X	X	X	X
Complex/Humanitarian Emergencies	X		X	X	X		
Developmental Disorders		X	X	X			
Developmental Disorders:Fetal Alcohol Syndrome	X			X			
Dioxin Exposure			X	X			
Disabilities & Health							X
Environmental Contamination: Fish				X			
Environmental Health		X	X	X		X	X
Environmental Health: Drinking Water						X	
Environmental Health Radiation							X

Subject	Africa	Americas	Asia & Pacific	Europe	Middle East	New Independent States	Global
Environmental Health: Risk Factors for Breast Cancer				X			
Fetal Alcohol Syndrome	X						
Global Health			X				
Gulf War Syndrome				X	X		
Health Surveillance			X				
Laboratory Methods Development: Organic Toxicants			X				
Lab. Standardization							X
Laboratory Standardization: Lead	X	X	X	X	X	X	
Laboratory: Diabetes							X
Laboratory: Urinary Biomarkers	X						
Lead Poisoning		X	X		X	X	
Micronutrient Malnutrition	X	X		X	X	X	
Natural Disasters		X	X				
Neonatal Screening		X	X	X		X	
Neural Tube Defects		X	X				
Osteoporosis				X			
Pesticides		X		X		X	
Rift Valley Fever	X						
Toxic Oil Syndrome				X			
Urban Environmental Health: Air Pollution & Gasoline Exposure		X					
Urban Health				X			
Vessel Sanitation Program		X	X	X	X		

Impact Assessment of NCEH Global Activities: FY 1998

Increasingly, there is a lack of sufficient resources to address global public health problems. Therefore, maximizing the impact of the modest technical resources invested is critical. During FY 1998, NCEH developed a new evaluation typology that strives to identify the different types of impact that our global collaborations may have. NCEH believes that these are appropriate for CDC as a national institution with a mission but not necessarily an explicit mandate related to international health.

NCEH plans to assess these five different types of impact:

- direct impact (in-country impact from NCEH's own field work)
- leveraging impact (influence on resource allocation and/or technical programming by partners)
- emulation impact (others use/adapt NCEH guidelines and/or programs as models for their own programs)
- enabling impact (training and/or capacity building)
- domestic impact (the application of overseas experiences and/or information in the U.S.)

Many activities will have multiple types of impact, thus bringing larger dividends to the investment of NCEH technical resources. Illustrative examples of each type of impact of NCEH's FY 1998 global activities are highlighted below.

Direct Impact

Direct impact is the impact that a collaboration or activity has on the health status of the population involved, and is usually determined on the basis of NCEH collaboration in the field. The following examples illustrate direct impact:

- A lead poisoning investigation in Egypt carried out by EHHE/SPB, CDC's Epidemiology Program Office (EPO), and national public health counterparts identified contaminated flour as the source of the outbreak and led to the prevention of future cases in the area.

- The evaluation of contamination in the drinking water supply and distribution networks in five Central Asian republics revealed a high risk for contamination in two cities and comparatively moderate levels of risk in three others. The findings and recommendations from this collaboration will lead to improved water quality and better health for people in these cities.

- The efforts of NCEH helped enable 60 different partners to work together to reduce iodine deficiency disorders in Russia. Iodization of salt in Russia is becoming a reality. These efforts will benefit the health of the Russian population and improve the ability of Russian school children to learn.

- The use of anemia intervention studies carried out in Kenya and Tanzania and still under way in Russia contributed to increased knowledge of appropriate interventions for anemia, and will directly benefit the health of these populations.

Leveraging Impact

Leveraging impact may result from international NCEH consultation that 1) leads to new public health policy; 2) influences resource allocation (e.g. number of personnel, size and distribution of budget) by a partner agency or country; or 3) influences technical programming by a partner agency or country. This type of impact may require very little investment by NCEH in terms of fiscal or personnel resources but may ultimately have tremendous public health impact by influencing resource allocation or technical programming decisions made by key partners. Examples of leveraging impact include the following:

- Providing data for decision making. The health assessments carried out in refugee populations generate data that guide humanitarian agencies in resource allocation and programming of humanitarian efforts.

- Participating in international working groups that develop guidelines, such as the Task Group meeting on WHO Guidelines for Air Quality and the revision of the *International Classification of Impairment, Disability and Handicaps*. This type of collaboration enables NCEH to help shape the development of WHO guidelines that will be used worldwide and also helps raise the visibility of these issues globally.

- Contributing to the technical programming of large-scale projects. During FY 1998 for example, EHHE provided technical consultation to the World Bank in designing the environmental surveillance component of a multi-million dollar project to be financed by the World Bank in Brazil.

Emulation Impact

Emulation impact occurs when a CDC guideline, method, or program element or approach is used or adapted by another country to address a public health issue in that country. This can occur after information has been requested directly by public health officials or researchers from another country or after NCEH has presented work at an international conference. Some examples of emulation impact follow:

- EHHE worked with Chinese counterparts to explore the feasibility of undertaking asthma surveillance within the framework of a birth defects surveillance system in China that is based on a system used in the United States. Chinese researchers may adapt the U.S. system to meet Chinese needs.

- NCEH presented information on the study of gene-gene interactions at the International Genetic Epidemiology Society Conference. Sharing these findings allows other researchers to use the techniques and lessons presented by NCEH in conducting their own research.

Enabling Impact

Enabling impact results from technical training or other type of capacity development, or from other contributions by NCEH that have a positive effect on the physical or technological infrastructure of the collaborating organization or country. The following examples illustrate enabling impact:

- NCEH trained collaborators in Egypt, India, Mexico, and Russia on using new blood lead measurement technology and provided assistance and oversight for epidemiologic studies. NCEH donated new blood lead measurement instruments to Russian laboratories, thus enabling these laboratories to undertake future blood lead analyses.

- As part of a longstanding collaboration with PAHO, EHHE conducted workshops in Bolivia, Ecuador, Mexico, and Venezuela dealing with natural disaster preparedness. These workshops will enable public health officials and first responders at all levels to prepare for more timely and effective response to natural disasters in the region.

- Many countries receive assistance on testing and standardizing laboratory methods from the Laboratory Sciences Division. Materials and support are provided for laboratory standardization of cholesterol and related lipids, lead poisoning, and birth defects to laboratories in many different countries. Such standardization enables these laboratories to provide accurate diagnostic results for their own clinical and public health decision making, and ensures that data produced from any studies are comparable to the data produced in other studies conducted in the United States and elsewhere.

Domestic Impact

Domestic impact results from applying information, experiences, lessons, or approaches from other countries to address public health problems and protect the health of Americans in the United States or abroad. Activities include work in other countries that 1) helps improve our understanding of a problem faced in U.S. public health; 2) helps us develop or refine strategies, approaches, or methods relevant to a problem faced in U.S. public health; or 3) contributes to international standardization of a measure relevant to a problem faced in U.S. public health. These examples illustrate domestic impact:

- The inspections, consultations, and outbreak investigations provided by the Vessel Sanitation Program (VSP) directly affect the water, sanitation, hygiene, and food systems present on international cruise ships. The VSP helps ensure the health and safety of all passengers aboard international cruise ships that call on U.S. ports.

- Technical consultation by NCEH staff in evaluating and training staff at American Embassies in Jordan, Israel, and Kuwait will directly protect the health and safety of both Americans and foreign service nationals at U.S. embassies in those countries.

- The standardization of international laboratories for cholesterol, lead, and birth defects screening ensures that studies in these countries are comparable to studies carried out in

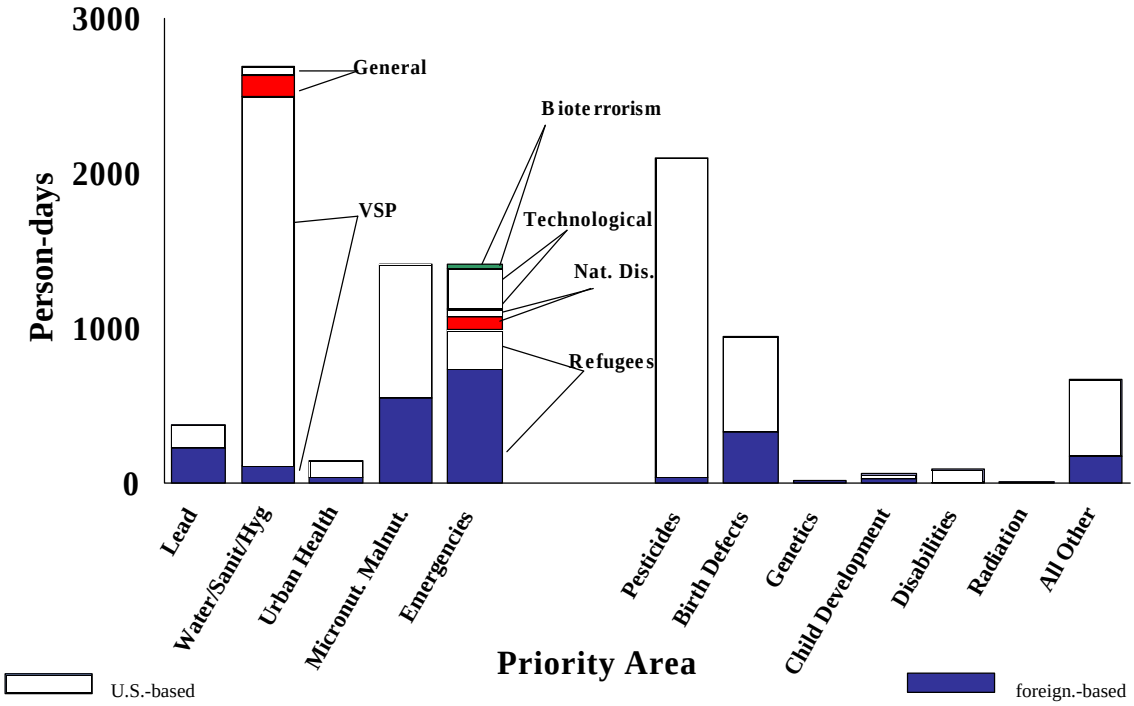
the United States. This effort also allows U.S. researchers to learn from the results of studies in other countries and to compare findings in the United States with findings abroad.

- Collaborations with colleagues in the Netherlands and China on studies of cerebral palsy, spina bifida, and anencephaly and with colleagues in Mongolia and Australia on studies of fetal alcohol syndrome, will enhance our understanding of these public health problems, which are also problems in the United States.

NCEH FY 1998 Global Activities, by NCEH Global Priority

NCEH was involved in a wide range of global activities during FY 1998. Most of these activities pertained to the five main global priorities established by the Center—childhood lead poisoning; water, sanitation and hygiene; urban health and megacities; micronutrient malnutrition; and emergency preparedness and response. Most of the remaining activities pertained to the other global priorities of the Center.

NCEH FY98 Global Activities: By NCEH Priority Area



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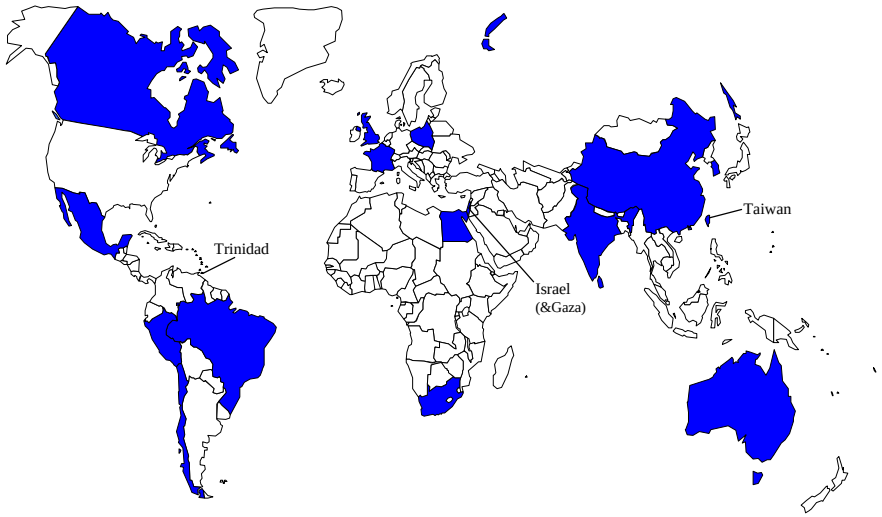
Childhood Lead Poisoning

Global Elimination of Childhood Lead Poisoning in the Next Century

Lead poisoning can cause various health problems, including mental retardation, stunting of growth, and death. The prevention of childhood lead poisoning in the United States has been a triumph for environmental public health. However, the lead issue is only now coming into focus in many other countries. The new portable blood lead analyzer, developed through NCEH support, has made testing more feasible in developing countries. NCEH is ready to expand CDC's efforts in the global arena.

The Center's objective is to help develop an effective international program to reduce childhood lead poisoning worldwide. NCEH is working with other countries to help them use science to guide public health actions and is trying to mobilize a global coalition of partners to address the lead problem, especially the need to raise global awareness of the issue.

NCEH FY98 Global Collaborations on Lead



During FY 1998, NCEH` collaborated with 18 countries on lead poisoning prevention projects. They spent 233 person-days overseas and 157 person-days in the U.S. working on issues related to lead.

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Activities

During FY 1998, NCEH researchers provided oversight and field support for blood lead surveys in Mexico and Russia; led an investigation into lead poisoning in Egypt and identified the source of contamination; met with PAHO officials to determine future lead analysis surveys in Latin America; consulted with the Middle East Regional Commission for future blood lead measurements in Egypt, Israel, Palestine, and Jordan; and led workshops and participated in meetings concerning the lead problem in India.

Global standardization of laboratory lead measurements is essential in order to better compare the extent of the problem throughout the world. NCEH's laboratory provided sets of whole blood materials with certified target values for lead to laboratories in Australia, Brazil, Canada, Israel, Korea, Peru, Poland, South Africa, Taiwan, Trinidad, and the United Kingdom. This collaboration will help improve the analytical accuracy and precision within these countries. NCEH staff also conducted in-country training in Chile, Mexico, Poland, and Russia related to the use of the new portable lead analyzer for blood and environmental analyses. This training strengthened the capacity of these countries to perform improved environmental health research related to lead.

Finally, NCEH developed a queryable database of research articles on the prevalence and sources of elevated blood lead worldwide. The database contains summary information, including abstracts and epidemiological findings and will be available on the NCEH Web site in FY 1999. It will help serve as a guide for further concerted evidence-based global action against childhood lead poisoning.

Impact

Some of NCEH's collaborations related to childhood lead poisoning have had a direct impact on the health of the population in collaborating countries. The most notable example is an outbreak investigation in Egypt, ultimately traced back to flour contaminated during the local grinding process. Virtually all NCEH collaborations have enabled collaborating countries to strengthen their environmental public health infrastructure through practical training in epidemiology and laboratory methods. NCEH support to help countries ensure the quality of their own blood lead testing supports country efforts to address their lead problem and also contributes to the international standardization of results, which will ultimately improve comparability of results among countries worldwide. Finally, NCEH has leveraged its efforts by working not only with countries but also with international organizations such as PAHO and WHO.

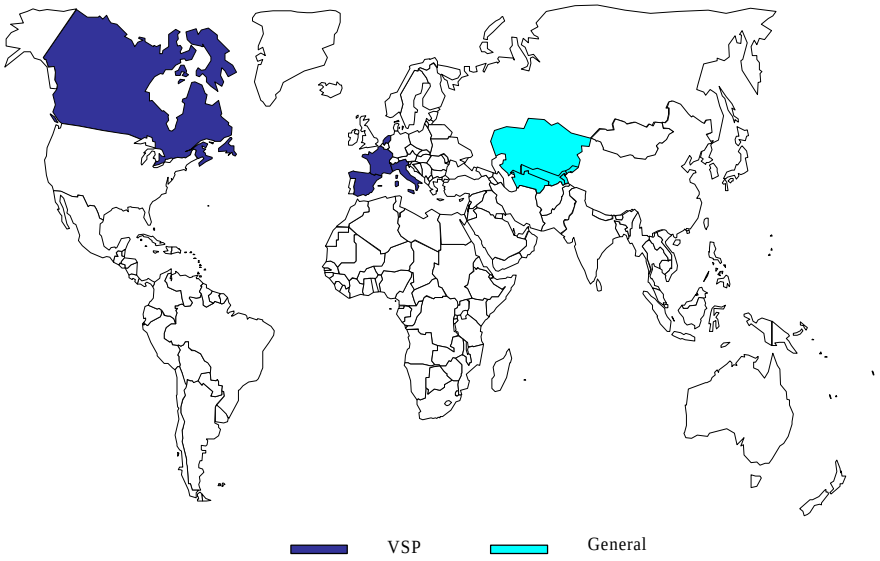
Water, Sanitation, and Hygiene

Better Health and Survival through Better Water, Sanitation, and Hygiene

Taken together, inadequate water, sanitation, and hygiene are the leading environmental cause of global disease burden.

NCEH's objective in this area is to collaborate in scientific study, technical consultation, and communications in order to act as a catalyst for a renewed focus on the human health issues that are present within the broader global agenda for water, sanitation, and hygiene. This priority enables NCEH to re-establish its capacity in water and sanitation in response to needs both within and outside the United States. The main challenge for the Center has been to identify the most appropriate type of engagement and then to develop concrete early activities.

NCEH FY98 Global Collaborations for Water, Sanitation, Hygiene



The Center collaborated with 12 different countries on issues related to water, sanitation, and hygiene (including activities of the Vessel Sanitation Program) during FY 1998.

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Activities

With one exception, this priority represents a relatively new endeavor for the Center. Thus, the depth and breadth of activities during the year were relatively modest.

Within the broader water and sanitation arena, during FY 1998, NCEH completed a systematic review of needs, issues, partners and opportunities for the Center related to global water supply, sanitation and hygiene. Specific activities included assistance to the U.S. Agency for International Development (USAID) in conducting an evaluation to determine the extent of contaminated drinking water supplies and distribution networks in seven cities in five countries of Central Asia. The evaluations revealed a high risk for contamination-induced illness in two of the cities and moderate levels of risk in the others. As a result, local staff were trained to conduct similar types of surveys, and foreign assistance efforts were focused on proper water distribution system management.

NCEH has had a strong Vessel Sanitation Program (VSP) in place for years. This program regularly inspects and monitors sanitation and health aboard cruise ships calling on U.S. ports; provides consultations for cruise ships under construction; conducts four annual training courses to educate cruise ship managers and sanitation personnel in water, sanitation and hygiene issues aboard their vessels; and investigates cruise ship outbreaks, upon request. During FY 1998, this program inspected over 130 ships coming into U.S. ports, provided technical consultation to shipyard personnel in the Bahamas, France, Germany, Italy, the Netherlands, and Spain, and conducted four training courses. In addition, this program, together with Canadian counterparts, investigated an outbreak on a cruise ship sailing between Canada and Alaska.

Impact

NCEH collaborations during FY 1998 had a direct impact on the health of both U.S. and non-U.S. citizens. VSP's investigation of the cruise ship outbreak curtailed further transmission of diarrhea pathogens. Routine VSP inspections are designed to ensure sanitary conditions aboard cruise vessels, thus protecting the health of passengers. The water distribution system assessments undertaken in Central Asia led to the direct improvement of water and sanitation in those cities. In addition, NCEH has enabled both foreign countries and the cruise ship industry to attain better water, sanitation, and hygiene systems through the training it has provided. Finally, the VSP is a long-standing example of the domestic impact that global activities provide in protecting the lives and health of U.S. citizens, both at home and abroad.

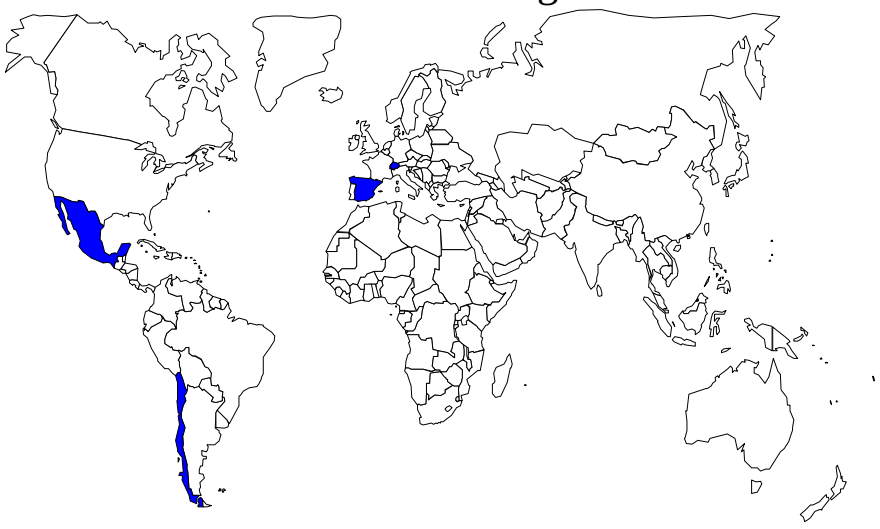
Urban Health and Megacities

Healthy Living in Healthy Cities

Half of the world's population now lives in urban settings. Rapid, unplanned urbanization creates unhealthy environments and an increased burden of disease. Health problems arise from a variety of sources: poor quality air, water, and sanitation and urban crowding. Disparities are found among and within cities. Reliable data are needed to guide effective public health action.

The Center's objective is to collaborate in scientific study and communications to address emerging urban environmental health threats globally. The challenge for NCEH in addressing global urban environmental health will be to clarify the appropriate niche for public health and then to work with key partners, especially those in other sectors.

NCEH FY98 Global Collaborations for Urban Health/Megacities



The Center collaborated with four countries during FY 1998 on issues related to urban health and megacities

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Activities

During FY 1998, NCEH completed a preliminary review of global urbanization, the urban environment, and urban health. One important gap identified was the lack of adequate health data to guide public health programming.

Specific activities during FY 1998 included continued participation in ongoing collaborations on studies of air pollution and child health as part of its longstanding collaboration, through PAHO, with Mexico's National Institute of Public Health. NCEH scientists have worked with their Mexican counterparts to design studies to help define human exposure to a variety of toxicants along both sides of the U.S.-Mexico Border. In addition, NCEH scientists collaborated with the Mexico's Ministry of Health and PAHO to evaluate exposures of workers in Mexico City to the key gasoline-related compounds (volatile organic compounds) including benzene and toluene. This investigation found elevated blood levels of benzene, toluene, ethylbenzene, m-/p-xylene, and o-xylene in these workers. These findings point to the need for further efforts to reduce air pollution in Mexico City and other cities with heavy vehicular traffic.

In Chile, an NCEH-supported PAHO staff member taught a course on environmental epidemiology and presented findings on the health effects of air pollution in Latin America. In addition, she collaborated with PAHO and the Ministry of Health of Chile to review health projects relating to urban health. This staff member also participated in a task group on WHO guidelines for air quality at WHO Headquarters in Geneva.

Finally, a senior NCEH staff member participated in the First World Congress on Health and the Urban Environment in Madrid, Spain. This was an opportunity to meet and network with key international agencies that address the issues of global urban environmental health.

Impact

NCEH collaboration with Mexican and other Latin American scientists will lead to increased knowledge of environmental health problems in these areas, particularly problems related to outdoor air pollution. These findings have relevance in the United States as well and may enable U.S. metropolitan areas to combat the ever-increasing levels of air pollution that they face as traffic congestion continues to worsen.

Additionally, NCEH collaboration with WHO and PAHO helped to leverage the Center's research and have contributed to the development of international guidelines for air quality.

Finally, participation in global meetings to discuss rapidly evolving global health issues contributes to the Center's ability to be a dynamic participant in this emerging global health agenda.

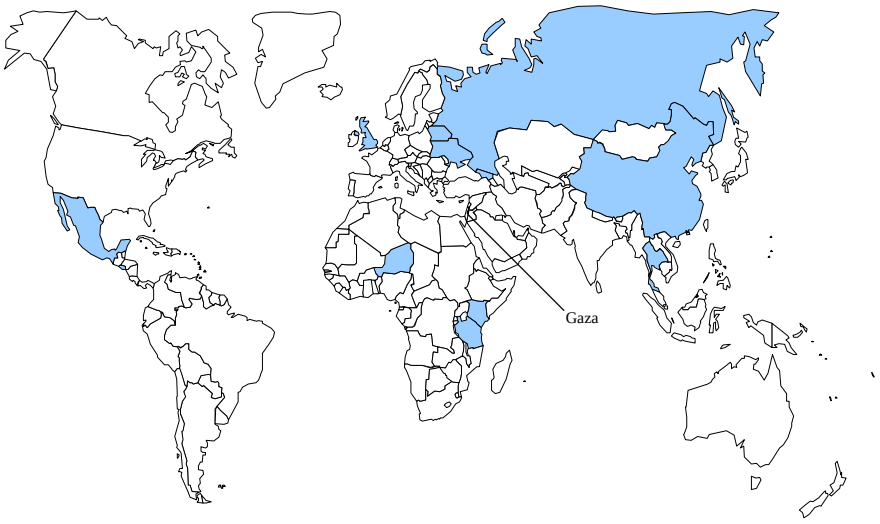
Micronutrient Malnutrition

Global Elimination of Micronutrient Malnutrition in the Next Century

Micronutrient malnutrition represents a huge burden of disease globally, affecting approximately one-third the world's population. Children and women are disproportionately affected by deficiencies in iron, vitamin A, iodine, and folate that can lead to low-birth weight, stunting, blindness, mental and developmental delay, and birth defects. Cost-effective interventions are available.

NCEH is part of an evolving CDC-wide effort to reduce the global burden of disease associated with micronutrient malnutrition. One of the Center's activities in this area is its longstanding field research in China to study the effects of folic acid on preventing of neural tube defects. In addition, NCEH's laboratory has the expertise and potential to become a global reference and referral laboratory for micronutrients.

NCEH FY98 Global Collaborations in Micronutrients



During FY 1998, NCEH collaborated with 13 different countries on issues related to micronutrients and micronutrient malnutrition.

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Activities

During FY 1998, every division within NCEH collaborated with international partners on the issue of micronutrients. The longstanding collaboration with China related to birth defects continued, focusing on the final analysis of the community-based folic acid intervention study in preventing neural tube defects.

NCEH staff also participated as part of the high visibility Gore-Primakov (formerly Gore-Chernomyrdin) Binational Commission in important prevention efforts aimed at iodine deficiency disorders (IDD) in Russia. NCEH helped to bring together approximately 60 different partners working on this problem. NCEH also supported broader CDC collaborations with the food industry related to both iodine and iron fortification issues. In addition, NCEH staff helped investigate an elevated number of cases of thyroid abnormalities among Peace Corps Volunteers in Niger. This study showed that the thyroid problems experienced by the volunteers were attributed to excessive iodine exposure, delivered via the water purification system used by the volunteers. The implications of this investigation have far reaching public health significance, not only for the Peace Corps, but also for recommendations for water purification provided by CDC and WHO.

In collaboration with several other partners within CDC, NCEH staff carried out an intervention trial for treating of moderate and severe anemia among refugee populations in Tanzania and Kenya. By the end of the 3-month trial, the prevalence of anemia among the study group decreased from 100% to 66% and on the basis of the study results, the team was able to recommend a safe, effective, therapeutic approach for treating refugee children with moderate to severe anemia. Finally, NCEH's laboratory collaborated with El Salvador, Mexico, and the United Kingdom in developing laboratory measurements of micronutrients and in training technical staff.

Impact

The investigation of thyroid disorders among Peace Corps Volunteers will have a direct impact on the health of Peace Corps Volunteers, as well as other U.S. Government personnel stationed overseas. The clinical results are a critical addition to current knowledge of iodine overload and its implications and provide support for the National Academy of Science in establishing an upper limit of micronutrient intake. The collaboration with the Russian food industry will eventually have a direct impact on the health of Russian women and children. The anemia intervention trials among refugees will extend the knowledge of micronutrient deficiencies among high-risk populations and will leverage NCEH expertise by assisting with the development of appropriate treatment strategies. Finally, NCEH's laboratory-based collaborations enhance other countries' capacity to undertake and ensure the quality of testing in national nutrition surveys.

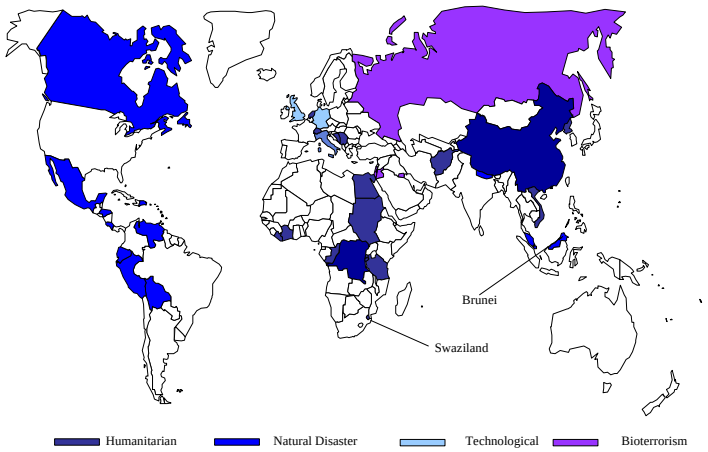
Emergency Preparedness and Response

Preparedness and Effective Response to Minimize the Health Impact of Emergencies

CDC has long been recognized for its leadership and technical expertise in the field of emergency preparedness and response. We must focus on preparedness and response to natural disasters, humanitarian emergencies, technological disasters and now, the new threat of terrorism.

NCEH's objective is to develop technical methods and to provide guidance and assistance for preparing and responding to natural disasters, complex humanitarian emergencies, technological disasters, and bioterrorism. Key approaches to achieving this objective include the following: 1) representing CDC in key planning and policy groups; 2) coordinating DHHS response to the full range of disasters or emergencies; 3) providing technical assistance to strategic partners, e.g. U.S. Government agencies, United Nations agencies, and non-governmental organizations; 4) expanding the capacity of both CDC and external partners to respond to emergencies (e.g. via training, workshops and mentored field experiences); 5) assisting foreign governments in planning for and responding to technological disasters; 6) conducting strategic research; and 7) developing a laboratory rapid toxic screen to measure a broad range of potential toxic chemicals. Highlights of NCEH's global activities during FY 1998 in each of these areas are given below.

NCEH FY98 Global Collaborations for Emergencies



NCEH collaborated with 33 different countries on issues related to the various types of emergencies, as noted in the legend.

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Activities

Natural Disasters: During FY 1998, NCEH participated in a wide range of international collaborations related to natural disasters. Through PAHO, NCEH conducted workshops in Bolivia, Ecuador, Peru, and Venezuela on the effects on the health sector (e.g. water, sanitation, health infrastructure) of the El Niño weather phenomenon. NCEH also presented lectures on emergency response to natural disasters in Costa Rica, Mexico, and Nepal. In addition, CDC/NCEH has held the technical lead role in responding to the health issues arising from the 1997 forest fires in Southeast Asia, with collaborations in Malaysia, Singapore, and Brunei.

Complex/humanitarian emergencies: During FY 1998, NCEH played an important role in responding to complex humanitarian emergencies. Health assessments were carried out in Afghanistan, Bosnia, Burundi, Congo, Liberia, Democratic People's Republic of Korea, Rwanda, Sudan, and Yugoslavia to assess the current and long-term needs of those vulnerable populations. In addition, and as noted in the section dealing with micronutrient malnutrition, epidemiological studies were carried out to examine the role of micronutrients on anemia status in refugee populations in Kenya and Tanzania. Finally, NCEH collaborated extensively with multinational organizations in developing policies and guidelines for working with these populations, and has a technical advisor detailed to the Department of Emergency and Humanitarian Action at WHO headquarters in Geneva.

Technologic Disasters: NCEH scientists collaborated with Italian researchers to complete the analysis of 500 serum samples from women of Seveso, Italy, a region which experienced an industrial accident in 1976 that exposed the population to large amounts of 2,3,7,8-tetrachlorodibenzo-p-dioxin. The analyses were performed in order to assess any relation among dioxin exposure, health effects, and markers of susceptibility.

Bioterrorism : NCEH staff consulted with four different countries during FY 1998 on issues relating to bioterrorism. An NCEH staff member was part of a team organized by the U.S. Department of State to evaluate embassies in Jordan, Israel, and Kuwait. This team performed a situation analysis, evaluated the system responsible for the medical response to any bioterrorist act, and conducted training in medical issues relating to bioterrorism for embassy staff in all three countries. In addition, NCEH was involved in evaluating a study of potential health effects resulting from a Russian chemical-weapons destruction facility.

Impact

NCEH collaborations in evaluating refugee health status and consultations on natural disasters and bioterrorism will ultimately have substantial direct impact on the health of affected populations. The collaborations with multinational organizations such as WHO, have enabled NCEH to leverage its experiences by contributing to the formulation of policy and guidelines and the identification of future research priorities.

Other NCEH Global Priorities

There are several areas in which NCEH has established expertise that are not yet main global priorities for the Center. These areas are considered developmental global priorities, in the sense that the Center's approach is dynamic in nature. Therefore, as awareness of these issues increases in the global arena, the global activities of NCEH in each of these areas will probably increase as well. Some of the other global issues that the Center worked on in FY 1998 are described below.

Pesticides

NCEH collaborated with nine countries during FY 1998 on the issue of pesticides. The Center collaborated with Denmark to examine in utero effects of pesticides, such as DDT and PCBs. The results showed that a reduction in certain functional test scores was associated more with exposure to methyl mercury than exposure to PCBs. The Center also collaborated with Denmark and Norway in examining the potential increased risk for breast cancer among women with high serum concentrations of potentially estrogenic compounds. The findings from these studies support the hypothesis that exposure to xeno-estrogens may increase the risk for breast cancer. In addition, NCEH collaborated with researchers in Kazakstan to examine levels of dioxins and pesticides in breast milk among women, demonstrating that a number of women had elevated levels of TCDD (a dioxin) in their breast milk. Finally, researchers from the Center helped determine the levels of pesticides potentially released into the water supply from a pesticide plant in Honduras during Hurricane Mitch. NCEH staff provided field specimen collection for a wide variety of possible environmental toxicants, such as heavy metals, persistent and non-persistent pesticides, and volatile organic compounds.

Birth Defects

For the past several years, NCEH has actively collaborated in a community-based intervention trial of folic acid for preventing neural tube defects in China. As noted in the section describing micronutrient malnutrition, the focus of activities during FY 1998 was the completion of the analysis from this trial and preparation of manuscripts for publication. The Center has detailed a resident advisor to China to continue the CDC/NCEH presence and potentially to help expand the range of CDC collaborations in China. In addition to China, NCEH has collaborated with Mexican researchers to study spina bifida and anencephaly (SBA) along the U.S.-Mexico Border. This study will collect prevalence data for SBA in the area that will be used to determine in which communities educational campaigns are needed to promote folic acid consumption among women of child bearing age. Finally, NCEH has collaborated as a partner in the International Center for Birth Defects (ICBD) in developing the International Clearinghouse for Birth Defects Monitoring Systems. The main activities of ICBD focuson international birth defect surveillance and etiologic studies geared toward birth defect prevention.

Genetics & Disease Prevention

NCEH researchers participated in an international conference examining ways to measure genetic interactions. NCEH scientists presented findings about the use of the case-only design in measuring the effects of gene-gene interactions, demonstrating that this method is appropriate.

Child Development

NCEH consulted with colleagues in South Africa and Germany on studies and recommendations for fetal alcohol syndrome (FAS), a preventable birth defect. The collaboration in South Africa was a follow-up to the FY 1997 studies of FAS among first graders in South Africa, and the collaboration with Germany was part of assistance in formulating the national guidelines on alcohol and health. Various aspects of the discussion will be included in the expert committee report to the Government of Germany. In addition, collaborations began with Australian researchers to begin a study examining the effects of multiple gestation on neurological disorders in children.

Disabilities and Health

NCEH is collaborating with WHO in revising the *International Classification of Impairments, Activities and Participation: A Manual of Dimensions of Disablement and Functioning* (ICIDH2). The culmination of this involvement was 1) completing a cooperative agreement between WHO and CDC to examine empirically the role of environmental factors as an essential component of the disabling process for adults and children, 2) carrying out field testing protocols internationally, and 3) assisting in the production of a two-digit classification code for environmental factors within the ICIDH2 framework.

Radiation

EHHE/RSB is a co-sponsor of the international program, Biosphere Modeling and Assessment Methods (BIOMASS), which is being conducted by the International Atomic Energy Agency, a branch of the United Nations. One of the purposes of BIOMASS is to test predictions made by environmental radiological assessment models appropriate for dose-reconstruction purposes against data measured in the environment.

WHO Collaborating Centres at NCEH

NCEH is home to three WHO Collaborating Centres, which were formed from a collaboration between CDC and WHO as part of an international collaborative network. The function of these centers is to use CDC's expertise to support WHO programs at varying levels. In addition, these centers contribute to increasing technical cooperation with and among countries by providing information, services, and advice and by stimulating and supporting research and training. The three WHO Collaborating Centres at CDC are for Environmental Epidemiology, Complex Emergency Preparedness and Response, and Laboratory Reference and Referral for Blood Lipids. A brief description of each Centre's activities follows.

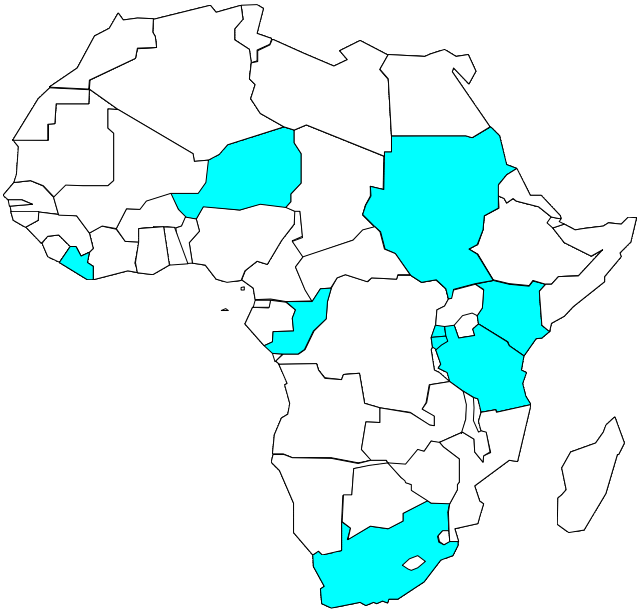
The WHO Collaborating Centre for Environmental Epidemiology was established 1) to collaborate on and assist in planning and implementing epidemiologic studies of the health effects of chemical and physical hazards in the environment; 2) to assist in assessing and interpreting human health risks due to environmental pollutants, in particular, asbestos, metals, pesticides, air pollutants and solvents; 3) to provide consultant support and assist the organization in developing technical information and guidance material on environmental epidemiology; 4) to collaborate with the organization in training activities in environmental epidemiology; and 5) to collaborate in transfering information and methods on environmental epidemiology to developing countries. It collaborated with the Spanish Government, through the Ministry of Health and Consumer Affairs, in the continued investigation of Toxic Oil Syndrome. It was also involved in training CDC/PAHO Fellows in Latin American cities and along the U.S.-Mexico border, as well as in planning and designing a study of the effects of air pollution on children's health in Mexico City.

The Collaborating Centre for Complex Emergency Preparedness and Response was established 1) to support the program, strategies, and policies adopted by the governing bodies of WHO at the global and regional level; 2) to develop and institutionalize pre- and post-graduate teaching of emergency response and disaster health management in academic or professional institutions; 3) to contribute to the formulation and evaluation of teaching methods, techniques, and strategies in the field of disaster health management; 4) to promote the assessment of response capacity and the preparedness status of health institutions in disaster-prone countries; and 5) to follow natural disasters case-studies in order to evaluate the cost effectiveness of national or international health responses. As detailed in previous sections, the Centre collaborated on projects and training relating to natural disasters in Central and South America and Southeastern Asia, participated in coordinating the response to humanitarian emergencies in Africa, Asia, Europe, and the Middle East, and performed epidemiological studies among refugee populations.

Finally, the Collaborating Centre for Reference and Research in Blood Lipids was established 1) to provide consultation on the determination of blood lipids and to exchange information about techniques of lipid determination; 2) to produce and distribute reference and standard material and make it available to other centers; 3) to provide guidance for the intra- and interlaboratory control; and to train medical and paramedical personnel. The Centre provided standardization support services to laboratories in Australia, Belgium, Canada, Chile, China, Costa Rica, the Czech Republic, Germany, Iceland, Israel, Italy, Japan, Mexico, the Netherlands, New Zealand, Poland, Portugal, Russia, Spain, Sweden, Switzerland and the United Kingdom.

Africa

NCEH FY 1998 Collaborations in Africa



CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Burundi

Complex/Humanitarian Emergencies

In November 1997, through EEHS/IERH, an epidemiologist from the National Immunization Program (NIP) assisted the Centre for Research on the Epidemiology of Disasters (CRED) in conducting a rapid assessment of the health status of the internally displaced population (IDP) in Burundi to determine priority needs and to evaluate the European Community Humanitarian Organization's (ECHO) funded activities in that country.

The assessment revealed that, overall, humanitarian response should only be approved in parts of the country where development programs cannot operate as a result of security concerns and that humanitarian assistance should be a mechanism for making the transition to post-crisis projects, which, in turn, preconditions for long-termdevelopment.

The leveraging impact of this activity is based on recommendations that will guide the European Community in its further humanitarian efforts in Burundi.

Congo

Complex/Humanitarian Emergencies

In November 1997, NCEH assisted the U.S. Agency for International Development's (USAID's) Office of Foreign Disaster Assistance (OFDA) in assessing the public health needs of the war-affected population in Brazzaville, Congo.

Emergency public health and clinical services, essential medications, potable water, and shelter were identified as short-term priority needs.

CDC technical recommendations helped guide U.S. foreign assistance to this population.

Kenya

Micronutrient Malnutrition

Although the Refugee Health project in Kenya is similar to the Tanzania Refugee Study of malnutrition and severe anemia (described later in this section), it also examines other possible causes of anemia due to folate and vitamin B12 deficiencies. LS/NBB staff assisted NCCDPHP in preparing field specimen collection materials and provided analyses for blood lead, vitamin A, and ferritin. LS/CBB staff also provided transferrin receptor (TfR) analyses.

The results of this study will help extend knowledge of the clinical and hematologic presentations of iron deficiency anemia (microcytic anemia) and folate deficiency (megaloblastic anemia) or vitamin B12 deficiency (pernicious anemia) among refugees and will assist in developing proper treatment strategies.

This study will have a direct impact on the health of the refugees and will contribute to global knowledge, and ultimately to better prevention and control of anemia among vulnerable populations.

Rift Valley Fever

EHHE/HSB staff joined investigators from NCID, WHO and the Ministry of Health in Kenya in investigating an outbreak of hemorrhagic fever in the Northeastern Province

of Kenya. Activities included collecting and analyzing surveillance data and designing and completing a seroprevalence survey for Rift Valley Fever (RVF) virus, which had been identified as the causative agent. Other activities included reviewing alternative causes of morbidity and mortality in the city of Garissa, Kenya.

This activity led to further understanding of the epidemiology of RVF. In addition, studies were undertaken to examine the environmental conditions surrounding the outbreak and to try to develop models that can predict future possible outbreaks.

Although RVF is not found in the United States, the ability to predict future outbreaks can protect U.S. citizens and interests abroad and contribute to global prevention efforts related to recurrent disease.

Liberia

Complex/Humanitarian Emergencies

Between June and July 1998, an NIP Epidemiologist, supported by EEHS/IERH, assisted the Groupe Européen d'Expertise en Épidemiologie Pratique (Epicentre) in conducting a rapid assessment of the health and nutritional status of the Sierra Leonean refugees in two camps in Liberia and in evaluating the data collection system and reliability of the existing mortality and morbidity surveillance systems at both camps.

The assessment revealed that malnutrition was at critical levels in both camps due to the lack of food. In addition, due to the low coverage of measles vaccination, there was immediate potential for a measles epidemic, which could also contribute to increasing mortality rates for children younger than 5 years of age.

This CDC technical assistance helped leverage resource allocation for humanitarian relief efforts in this population.

Niger

Micronutrient Malnutrition

An elevated number of cases of thyroid abnormalities were diagnosed in Peace Corps Volunteers (PCVs) in Niger. EHHE/RSB and LS/NBB staff were asked to investigate the problem by the Director of the Office of Medical Services for the Peace Corps. Medical records were reviewed by NCCDPHP, which also undertook a field investigation in Niger. Water purification systems were examined, with water samples collected for iodine testing. Samples of salt used in each PCV's home were also collected, along with blood and urine samples from each PCV when a physical examination was conducted. NCEH/ NBB coordinated laboratory selection and shipment of samples to a contract laboratory for serum thyroid profiles and urinary iodine testing.

Analyses of iodine from water samples and salt samples at NCEH conclusively proved that the problem lay with the type of water purification system and column used for the Niger water. All PCVs were supplied with water purification systems that contained an iodide-based antimicrobial filter; average water consumption by a PCV was 9 L/day. The iodine intake from one model was estimated to be 330 times higher than the Recommended Daily Allowance (RDA). In this investigation, thyroid disease appeared to result from excessive iodine consumption, not from deficiency.

The implications of this investigation have far-reaching public health significance for the Peace Corps and also for recommendations

for water purification made by CDC and WHO. The clinical results are a critical addition to current knowledge of iodine overload and its implications. Additional unique data will be gained by monitoring both the natural history of prolonged exposure to high levels of iodine among the PCVs and recovery of the volunteers. This investigation also provides support for the National Academy of Sciences in establishing an upper limit for micronutrient intakes, including iodine intake.

Rwanda

Complex/Humanitarian Emergencies

In November 1997, an NIP Epidemiologist, working through EEHS/IERH, assisted the Centre for Research on the Epidemiology of Disasters (CRED) in conducting a rapid assessment of the health status of the internally displaced population (IDPs) to determine priority needs and to evaluate the European Community Humanitarian Organization's (ECHO) funded activities in Rwanda.

The assessment revealed that, overall, humanitarian response should only be approved in parts of the country where development programmes cannot operate as a result of security concerns and that humanitarian assistance should be a mechanism for making the transition from the crisis to post-crises projects, which, in turn, are essential preconditions for long-term development.

Results of this assessment leveraged humanitarian efforts by the European Community in Rwanda.

South Africa

Fetal Alcohol Syndrome

Fetal alcohol syndrome (FAS) is a newly recognized, emerging health problem in international communities and demands immediate prevention and intervention initiatives. In Fiscal Year (FY) 1997, as part of a collaborative team, CDC was asked to participate in a prevalence study of FAS among first graders in the Wellington wine growing region of the Western Cape Province near Cape Town, South Africa. The Team found a remarkably high prevalence of this preventable birth defect in first graders. Of the four hundred children examined by pediatric dysmorphologists, 3% were diagnosed with FAS. Another 5% of the children were suspected to have FAS but the diagnosis was deferred until results of cognitive testing were available. Another 600 children in the Wellington district were examined in FY 98 by the physicians trained during the July 1997 site visit.

A collaborative report on the 1997 site visit to South Africa in which the National Institute of Alcoholism and Alcohol Abuse (NIAAA) and CDC were participants was completed in FY 98 and is available from NIAAA. This report includes impressions and recommendations from all participants about future activities in South Africa. This site visit report should aid efforts by both the U.S. and the South African collaborators to keep FAS prevention activities a highly visible priority for the Gore-Mbeki Commission discussions. This report covers the follow-up activities in Capetown and Johannesburg in December 1997. The preliminary results of the study, prevalence rates, and plans for the future were presented at the International Birth Defects Meeting (IBDM) held in Capetown. In addition, NCEH/CDDH/DD participated in planning meetings in Johannesburg to outline

future prevention activities. Finally, DD staff participated in a two day follow-up in Wellington, Western Cape to present the preliminary results of the study and plan prevention efforts with the local community leaders.

DD has continued to pursue collaboration with the University of Cape Town (UCT), the new School of Public Health (SPH) in the Medical University of South Africa (MEDUNSA) in Johannesburg, the mayor and task force in Wellington, and other South African investigators on FAS prevention and surveillance activities. However, funds to support further collaboration have not been identified and thus activities are currently limited to conference calls and technical assistance through email. The South African participants recognize the need to develop and implement a low cost, user-friendly surveillance and data management system (similar to what is being developed with CDC funds in U.S. state health departments) as prevention efforts get under way. In addition to evaluation of the prevention efforts, an ongoing surveillance system can be the basis for collecting other epidemiological data to better understand the risks for and public health implications of FAS, in all of South Africa. As the new U.S. state-based surveillance and university-based surveillance and prevention projects develop and implement their protocols, CDC has continued to invite the UCT and other South African researchers to participate.

The outcome of this project was a description of a case finding and surveillance methodology that identified children with FAS and other alcohol-related disorders in a school setting. The methodology used the medical and education systems for case finding, has the ability to monitor trends and evaluate prevention efforts, and can be replicated in other countries.

There are many important questions remaining about FAS in South Africa that could be useful for the U.S. and other global partners. Specifically, information is needed about the resources available for high risk children, mothers, and their families and how to bring those resources to the prevention of FAS. There are many prevention strategies that have been used in the U.S., some with good results and many strategies that could be tested in the South African environment. The U.S. investigators can share what they have learned about working with legislatures, federal and state programs, parent groups, public awareness campaigns, alcohol treatment and family planning programs, different cultural groups, and local community groups to prevent FAS. At the same time, there are many other questions that can be answered from collaboration with the South African investigators. CDC and other U.S. investigators should recognize the unique opportunities that support to, and collaborations with, the South African investigators provide for increasing our knowledge of preventing this birth defect in the U.S. and elsewhere. FAS is not only a newly recognized, emerging health problem in South Africa but in Eastern European countries as well. Low cost, effective surveillance and prevention methods are crucial. Working with the South African investigators, the CDC can learn about prevention, public health provider education, case finding, and surveillance of a preventable birth defect in different racial and cultural groups as well as in different health care delivery systems. This has direct importance to the development and implementation of FAS surveillance and prevention in U.S. populations and globally. Collaboration has improved capacity building at the local, provincial, and national level in South Africa and the U.S. investigators have learned new strategies for developing this capacity building in special populations. In the Gore-

Mbeki bi-national commission (BNC), July 1997 Health Working Group report, directives for collaboration and capacity building on FAS in South Africa were outlined. In the upcoming 1999 Gore-Mbeki BNC agenda, FAS is a leading topic for discussion.

The current activity not only worked to build capacity in South Africa but continued collaboration has potential for developing a low cost system for identifying children with birth defects and developmental disabilities internationally. The method of case finding and screening used in South Africa will provide the U.S. and other countries with a low cost, surveillance system for these and similar conditions and a method for early identification of children with special health needs and families at risk. The outcome of this project was a description of a case finding and surveillance methodology that identified children with FAS and other alcohol-related disorders in a school setting. The methodology used the medical and education systems for case finding, has the ability to monitor trends and evaluate prevention efforts, and can be replicated in other countries. This will ultimately directly impact the health of these populations.

Laboratory Standardization: Lead

LS/NBB provided laboratorians in South Africa with four sets of whole blood materials with certified target values for lead in order to improve analytical accuracy and precision.

This collaboration enabled South African laboratorians to ensure the quality of their own blood lead testing within the context of clinical care and public health programming in the country.

Sudan

Complex/Humanitarian Emergencies

At the request of WHO, an EEHS/IERH-sponsored NCID epidemiologist conducted a health assessment in southern Sudan during May and June 1998. The assessment provided important information to the humanitarian-aid community on the health status and needs of people affected by the most recent violence that occurred during the Sudanese civil war. After the assessment, representatives at the WHO Regional Office for the Eastern Mediterranean (EMRO) were debriefed about the recently conducted assessment of the regional and local health system and the health and nutritional status of the local and internally displaced population (IDP) in the Bahr El-Ghazal Region of Sudan.

This collaboration supports U.S. Government objectives and interests in providing humanitarian assistance in response to international complex emergencies. The impact of this activity was the allocation of resources and technical programming for humanitarian relief efforts for this population.

Complex/Humanitarian Emergencies:OLS

Operation Lifeline Sudan (OLS) is a consortium of non-governmental organizations (NGOs) and UN agencies that operates both in the northern sector (OLS/N) and southern sector (OLS/S) of Sudan. The assessment of the health sector of OLS/S had been requested by member NGOs that constitute OLS/S. NCEH collaborated in this assessment beginning in January 1998.

During FY 1998, the health information system (HIS) assessment was completed, a fair amount of the work for the full assessment was completed and sections of the report were written, and a plan was prepared

for completing and documenting response to the remaining Terms of Reference. A preliminary report was anticipated for presentation at a meeting of OLS/S partners in March 1999, with the final written report to follow.

This assessment of the health sector of OLS/S helped clarify for donor agencies the structure and function of this system. This information may be used to make changes to the organization or in allocating resources to different sections of the organization.

Tanzania

Micronutrient Malnutrition

Iron deficiency is a major cause of anemia worldwide; however, in developing countries, assessment is difficult because inflammation and infection skew the results of traditional laboratory measurements, such as ferritin levels. NCEH's laboratory provided field-specimen collection materials for a CDC/CARE Health Initiative-supported study entitled "Clinical Trial to Determine the Most Effective Method to Treat Moderate Anemia in Refugee Children in Kigoma Region, Tanzania," which was undertaken by EEHS/IERH. In a randomized, therapeutic trial for anemia, serum samples were obtained from 215 Burundian refugee children in a camp in Tanzania at enrollment and after 12 weeks residence.

The study results showed the effect of iron and vitamin supplementation on the hemoglobin levels of three groups of anemic children receiving monthly presumptive malaria treatment compared with the levels of children receiving standard case management for malaria.

Although all children were severely or moderately anemic at enrollment, as measured by hemoglobin status, only seven were iron deficient as defined by serum ferritin (SF) levels < 12 ng/mL due to elevation of SF by infection or inflammation. In contrast, 95% had transferrin receptor (TfR) levesl > 8.5 ug/mL, indicating iron deficiency. After 12 weeks of iron therapy, the great majority (93.5%) of children had >1 g/dL increase in hemoglobin; 34.0% were no longer anemic, and 27.4% had normal TfR levels. Anemic children were five times more likely than non-anemic children to have TfR levels indicating iron deficiency. In contrast, similar proportions of anemic and non-anemic children had low SF levels, which indicated iron deficiency. There was no association between SF level and sample hemolysis, enrollment blood smear positivity for malaria, or degree of malaria parasitemia. More children with illness (fever > 37.5C and recent reported illness) had an elevated SF level (> 140 ng/mL) than those without illness ($p = 0.054$). In contrast, there was no association between TfR levels and illness, nor with any of the variables listed above. The diagnostic ability of SF is limited in populations, such as those in refugee camps, where there are high levels of infection and inflamation. Transferrin receptor assay, however, is not complicated by problems of hemolysis and infection and will be a valuable tool in studying iron status among compromised populations such as refugees.

The information will directly affect treatment guidelines for malaria and anemia among refugee children. The study provided a unique opportunity to validate the usefulness of transferrin receptors (TfR), compared with the limited utility of hemoglobin, serum iron/total iron binding capacity, and ferritin in similar field studies. This work directly benefitted the health of study participants.

Americas

NCEH FY 1998 Collaborations in the Americas

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Argentina

Cholesterol and Related Lipids: Cholesterol Reference Methods

In 1989, the U.S. National Cholesterol Education Program (NCEP) began an unprecedented campaign to educate the medical community and the general public about the risk factors for coronary artery disease (CAD). To identify individuals at risk for CAD, NCEP recommended classifying patients using specific medical decision points for total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG). Proper classification of a patient's risk based on these medical decision points requires reliable and standardized measurements; therefore, NCEP also made accuracy and precision recommendations for clinical laboratories.

A practical approach to standardizing lipid and lipoprotein measurements is to ensure that diagnostic products are properly calibrated by the manufacturers and traceable to the accuracy base. NCEP has recommended that the reference methods run at CDC serve as the accuracy base for lipid and lipoprotein measurements. In 1990, in its capacity as a WHO Collaborating Centre for Laboratory Reference and Referral for Blood Lipids, CDC established the Cholesterol Reference Method Laboratory Network (CRMLN) to provide reference services to manufacturers and clinical laboratories. CRMLN laboratories use the CDC reference methods or designated comparison methods that are closely linked to the CDC reference methods. These laboratories are evaluated monthly by CDC to ensure that they meet the strict criteria necessary for interaction with manufacturers and the clinical laboratory community. Many countries outside the United States have adopted the NCEP recommendations and have sought CDC's assistance in meeting them. Argentina is one such country which received assistance from NCEH.

The testing and standardization of laboratory methods will enable other laboratories around the world to provide accurate diagnostic results for clinical decision making.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of the LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease. In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Laboratorio de Análisis Clínicos, San Juan, Argentina.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable with the data obtained from other epidemiological studies conducted in the United States and globally.

Bahamas

Vessel Sanitation Program

The Vessel Sanitation Program (VSP) was established in 1975 as a cooperative activity between CDC and the cruise ship industry to address the issue of sanitation aboard cruise ships. This program assists the industry in fulfilling its responsibility for developing and implementing comprehensive sanitation programs in order to minimize the risk for gastrointestinal diseases.

VSP also offers consultative services to the shipping industry, including reviewing plans for renovations and new construction of ships. In FY 1998, the program consulted with shipyard personnel in the Bahamas. With 42 ships being built or renovated around the world from 1998 through 2001, VSP has increased its commitment to working with the cruise ship industry to ensure that new and renovated vessels meet U.S. Public Health standards.

This program helps ensure the health of both U.S. and foreign travelers aboard cruise ships around the world.

Bolivia

Natural Disasters

In August 1998, PAHO drew upon NCEH as a WHO Collaborating Center for Environmental Epidemiology to conduct workshops on documenting the effects on the health sector of the weather phenomenon El Niño in seven severely affected countries in the Americas. The third of these workshops was conducted in La Paz, Bolivia, where El Niño was primarily manifested by drought, although heavy rains causing mudslides, extremely cold temperatures, hailstorms, and outbreaks of cholera were also identified. These workshops enabled public health officials in Bolivia to prepare to respond quickly and effectively to future natural disasters of this type through training in disaster epidemiology.

Brazil

Birth Defects: Neonatal Screening

LS/CDD has provided dried-blood-spot quality assurance materials and performance evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried-blood-spot materials have been distributed; reported data have been analyzed, and reports have been developed for participating laboratories.

As part of an international quality assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maply syrup urine disease, and homocystinuria screening tests to Brazil's ten neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for clinical decision making. The standardization of these laboratories ensures that the data

produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Environmental Health

EHHE provided consultation to the World Bank on specific components of Project VIGISUS, a comprehensive public health surveillance program to be undertaken by the Brazilian Ministry of Health. NCEH has provided consultation on designing and implementing the environmental health surveillance component of the project. Activities will focus on the following areas of environmental health: vectors and other biologic factors in environmental health; air, water, and soil quality; environmental contaminants such as lead, mercury, and pesticides; and responses to natural disasters and toxic releases.

This NCEH consultation will greatly influence the technical programming of a large (multi-million dollar) project to be financed by the World Bank and carried out by Brazil. In addition, this project will examine several areas of environmental health that are current, or possible future, concerns to U.S. public health. The process and results of environmental health surveillance in Brazil may provide opportunities for the United States to learn from these experiences as this country faces comparable issues.

Laboratory Standardization: Lead

LS/NBB provided laboratorians in Brazil with four sets of whole blood materials with certified target values for lead in order to improve analytical accuracy and precision. This collaboration enabled Brazilian laboratorians to ensure the quality of their own blood lead testing within the context of clinical care and public health programming in the country.

Canada

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials andperformance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried-blood-spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality assurance program, NCEH/LS/CBB staff provided dried-blood-spot quality-control and performance- evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, phenylketonuria, galactoseia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria screening tests to Canada’s nine neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.

NCEH also conducted performance evaluations for HIV antibody testing on dried-blood-spots in Ottawa. Quality-control materials have been validated and distributed to assist in determining seroprevalence among child-bearing women.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Cholesterol and Related Lipids: Cholesterol Reference Methods

In 1989, the U.S. National Cholesterol Education Program (NCEP) began an unprecedented campaign to educate the medical community and the general public about the risk factors for coronary artery disease (CAD). To identify individuals at risk for CAD,NCEP recommended classifying patients using specific medical decision points for total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG). Properly classifying a patient's risk on the basis of these medical decision points requires reliable and standardized measurements; therefore, NCEP also made accuracy and precision recommendations for clinical laboratories.

A practical approach to standardizing lipid and lipoprotein measurements is to ensure that diagnostic products are properly calibrated by the manufacturers and traceable to the accuracy base. NCEP has recommended that the reference methods run at CDC serve as the accuracy base for lipid and lipoprotein measurements. In 1990, in its capacity as a WHO Collaborating Centre for Laboratory Reference and Referral for Blood Lipids, CDC established the Cholesterol Reference Method Laboratory Network (CRMLN) to provide reference services to manufacturers and clinical laboratories. CRMLN laboratories use the CDC reference methods or designated comparison methods that are closely linked to the CDC reference methods. These laboratories are evaluated monthly by CDC to ensure that they meet the strict criteria necessary for interaction with manufacturers and the clinical laboratory community. Many countries outside the United States have adopted NCEP recommendations and have sought CDC's assistance in meeting them.

Canada is one such country which received assistance from NCEH.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for clinical decision making.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health (NIH).

The goal of the LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease. In this collaboration, NCEH provided standardization support services to lipid research laboratories at the following institutions: 1) St. Paul's Hospital, Vancouver, British Columbia; the 2) BC Institut de Recherches Cliniques, Montreal, Quebec; and 3) the Montreal Heart Institute, Montreal, Quebec.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Laboratory Standardization: Lead

As part of the blood lead level reference standardization (BLLRS), LS/NBB provided labor- atorians in Canada with four sets of whole blood materials with certified target values for lead, to improve analytical accuracy and precision.

This collaboration enabled Canadian laboratorians to ensure the quality of their own blood lead testing within the context of clinical care and public health programming in the country.

Vessel Sanitation Program

The Vessel Sanitation Program (VSP) was established in 1975 as a cooperative activity between the CDC and the cruise ship industry to address the issue of sanitation aboard cruise ships. This program assists the industry in fulfilling its responsibility for developing and implementing comprehensive sanitation programs in order to minimize the risk for gastrointestinal diseases.

VSP also offers consultative services to the shipping industry, including reviewing plans for renovations and new construction of ships. In FY 1998, the program consulted with shipyard personnel in Canada. With 42 ships being built or renovated from 1998 through 2001, the VSP has increased its commitment to working with the cruise ship industry to ensure that new and renovated vessels meet U.S. Public Health standards.

This program helps ensure the health of both U.S. and foreign travelers aboard cruise ships around the world.

Chile

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothryoidism, and phenylketonuria screening tests to Chile’s two neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Cholesterol and Related Lipids: Cholesterol Reference Methods

In 1995, CDC began a collaboration with the Pan American Health Organization (PAHO) to develop a network of reference centers in Latin America and the Caribbean countries.

Cardiovascular disease (CVD) has become the leading cause of morbidity and mortality in Latin America and the Caribbean Countries. Ministries of Health have identified the prevention of CVD as a priority, including the need for health promotion and interventions to reduce risk factors for the disease. However, the components necessary for implementing a population strategy, including reliable lipid measurements are lacking and need to be developed. Therefore, CDC and PAHO have agreed to develop a model system in Latin America and the Caribbean Countries in order to produce valid lipid measurements for the population and to develop prevention strategies for people at high risk for CVD. PAHO's Non-Communicable Diseases Program has begun a series of projects in Latin America and the Carribean countries called the *Conjunto de Acciones para la Reducción Multifactorial de las Enfermedades no Transmisibles* (CARMEN), which is designed to conduct epidemiologic investigations and to provide interventions for preventing non-communicable diseases, including heart disease.

Chile is one country which received assistance from NCEH.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from the CARMEN study is comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health (NIH). The goal of the LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for the detecting, reating, and preventing cardiovascular disease. In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Pontifica Universidad Católica de Chile, Santiago, Chile.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Environmental Health

A PAHO staff member, supported by EHHE/HSB, taught a short 2-day course on environmental epidemiology and was a keynote speaker at the National Congress of Epidemiology, presenting a paper entitled "The Health Effects of Air Pollutants: Experience from Latin American Countries."

This staff member also participated in a meeting to review health projects conducted in collaboration among PAHO, the Chilean

Ministry of Health, and the University of Chile.

This activity helped increase Chile's technical capacity in environmental health by teaching new epidemiological methods. In addition, participation in the conference on air pollution in Latin America may provide lessons from other countries that can be adapted or applied to problems faced in the United States.

Lead Poisoning

In collaboration with the Ministry of Health of Chile, EHHE/HSB organized a workshop entitled "Lead Poisoning: Prevention and Control." This workshop included training of participants in the use of the portable instruments for blood and environmental analyses and for pilot field work.

Beyond the expansion of standardized laboratory methods, this activity enabled Chilean public health officials to address their own problems related to lead poisoning.

Costa Rica

Cholesterol and Related Lipids: Cholesterol Reference Methods

In 1995, CDC began a collaboration with the Pan American Health Organization (PAHO) to develop a network of reference centers in Latin America and the Caribbean countries. Cardiovascular disease (CVD) has become the leading cause of morbidity and mortality in Latin America and the Caribbean Countries. Ministries of Health have identified the prevention of CVD as a priority, including the need for health promotion and interventions to reduce risk factors for the disease. However, the components necessary for implementing a population strategy, including reliable lipid measurements are lacking and need to be developed. Therefore, CDC and PAHO have agreed to develop a model system in Latin America and the Caribbean Countries to produce valid lipid measurements for the population and to develop prevention strategies for people at high risk for CVD. PAHO's Non-Communicable Diseases Program has begun a series of projects in Latin America and the Carribean countries called the *Conjunto de Acciones para la Reducción Multifactorial de las Enfermedades No transmisibles* (CARMEN), which is designed to conduct epidemiology and provide intervention for non-communicable diseases, including heart disease.

The *Instituto Costarricense de Investigación y Enseñanza en Nutrición y Salud* (INCIENSA) was selected as the CARMEN laboratory in Costa Rica. This laboratory has received CDC-NHLBI LSP Part 1 for standardization of their methods. CDC has provided consultation via email regarding standardization of the methods at INCIENSA.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from the CARMEN study are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services.

Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of the LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease. In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Laboratorio de Bioquímica y Radioinmunoanálisis, Cartago, Costa Rica.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Natural Disasters

An EHHE/HSB epidemiologist presented a lecture entitled *"La epidemiología de desastres en las Américas"* at the Pan American Congress on Disaster Medicine and Emergency, held on March 1-6, 1998. The objective of the conference was to present current issues in pre- hospital and disaster medicine, including clinical, public health, and epidemiologic topics. Participants were mainly clinicians and first responders from the Latin American region, national, state, and jurisdictional levels.

This activity will enable first responders at all levels to prepare for more timely and effective responses to natural disasters in the region.

Pesticides

An EHHE/HSB staff member attended the International Conference on Pesticide Use in Developing Countries: Impact on Health and Environment. This conference was an important source of information in support of NCEH's activities related to pesticide use and pesticide poisoning not only in the United States, but along the US-Mexican border and worldwide. Co-sponsored by the National Institute for Working Life in Sweden and the Universidad Nacional, Costa Rica, the conference included plenary sessions, oral presentations, poster presentations, field trips, and focused workshops.

Knowledge gained from this conference may prove useful as NCEH addresses pesticide-related public health concerns in the United States

Cuba

Cholesterol and Related Lipids: Cholesterol Reference Methods

In 1995, CDC began a collaboration with the Pan American Health Organization (PAHO) to develop a network of reference centers in Latin America and the Caribbean countries. Cardiovascular disease (CVD) has become the leading cause of morbidity and mortality in Latin America and the Caribbean countries.

Ministries of Health have identified the prevention of CVD as a priority, including the need for health promotion and interventions to reduce risk factors to the disease. However, the components necessary for implementing a population strategy, including reliable lipid measurements are lacking and need to be developed. Therefore, CDC and PAHO have agreed to develop a model system in Latin America and the Caribbean countries to

produce valid lipid measurements for population and high risk strategies for CVD prevention. PAHO's Non-Communicable Diseases Program has begun a series of projects in Latin America and the Carribean countries called the *Conjunto de Acciones para la Reducción Multifactorial de las Enfermedades No transmisibles* (CARMEN), which is designed to conduct epidemiologic investigations and to provide interventions for preventing non-communicable diseases, including heart disease.

One scientist from NCEH/LS/SAB visited Havana, Cuba, to evaluate a laboratory for participation in the program. The laboratory was selected for participation, and since then CDC has provided consultation to this laboratory at the National Institute of Nutrition regarding standardization. Standardization has not begun for this laboratory since the 1998 hurricane season was particularly devastating and Cuba has had other public health priorities to deal with.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from the CARMEN study are comparable to other epidemiological studies conducted in the United States and globally.

Ecuador

Natural Disasters

In August 1998, PAHO called upon CDC as a WHO Collaborating Centre for Environmental Epidemiology to conduct workshops on documenting the effects on the health sector as related to the weather phenomenon El Niño in seven severely affected countries in the Americas. The first of these workshops was conducted in Guayaquil, Ecuador, where the manifestations of El Niño were primarily attributed to heavy rains and extensive flooding, particularly along the coastline.

This activity enabled Ecuadorian public health officials to better prepare to address weather-related natural disasters that may occur in the future.

El Salvador

Micronutrient Malnutrition

Working in conjunction with NCCDPHP/ DNPA, LS/NBB staff traveled to El Salvador to train laboratorians in the assessment of vitamin A by the Futterman fluorescence method in the 1998 El Salvador Family Health Survey. NBB provided calibrators and quality-control materials for this assay, as well as additional specimen testing for vitamin A by high pressure liquid chromatography (HPLC). Later evaluation of the Salvadorian data quality was provided by NBB staff. Consultation continues in 1999 for DNPA staff on this project.

This collaboration enabled Salvadoran laboratories to utilize a method recommended by CDC to assess vitamin A status biologically as part of a large public health survey.

Guatemala

Birth Defects: Neonatal Screening

The NCEH has provided dried-blood-spot quality assurance materials and performance evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia,

maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated; computer programs for data analyses have been developed, dried blood spot materials have been distributed; reported data have been analyzed; and reports have been developed for these laboratories.

As part of an international quality assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance evaluation materials for congenital hypothyroidism screening tests to Guatemala's two neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to other epidemiological studies conducted in the United States and globally.

Mexico

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality assurance materials and performance evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated; computer programs for data analyses have been developed, dried blood spot materials have been distributed; reported data have been analyzed; and reports have been developed for these laboratories.

As part of an international quality assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance evaluation materials for congenital hypothyroidism,phenylketonuria, galactosemia, and congenital adrenal hyperplasia screening tests to Mexico's six neonatal screening laboratory. Data analyses were performed and reports were developed for these laboratories.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to other epidemiological studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization-CARMEN

In 1995, CDC began a collaboration with the Pan American Health Organization (PAHO) to develop a network of reference centers in Latin America and the Caribbean countries. Cardio-vascular disease (CVD) has become the leading cause of morbidity and mortality in Latin America and the Caribbean Countries. Ministries of Health have identified the prevention of CVD as a priority, including the need for health promotion and risk factor intervention. However, the components necessary for implementing a population strategy, including reliable lipid measurements are lacking and need to be developed. Therefore, CDC and PAHO have agreed to develop a model system in Latin

America and the Caribbean Countries to produce valid lipid measurements for population and high risk strategies for CVD prevention. PAHO's Non-Communicable Diseases Program has begun a series of projects in Latin America and the Carribean countries called the *Conjunto de Acciones para la Reducción Multifactorial de las Enfermedades no Transmisibles* (CARMEN), which is designed to conduct epidemiologic investigations and to provide interventions for preventing non-communicable diseases, including heart disease.

The Mexican laboratory selected in 1996 (National Institute of Cardiology, Mexico City) has continued participation in the CDC-NHLBI LSP. This laboratory is ready to provide lipid measurements for CARMEN when the infrastructure is developed.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from the CARMEN study are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization-NHLBI

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health (NIH).

The goal of the LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease. In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Instituto Nacional de Cardiología, Tlalpan, Mexico City, Mexico.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Environmental Health

EHHE/HSB participated in a binational meeting of the Border XXI Subcommittee workgroups, which took place in Reynosa, Mexico. NCEH staff also presented preliminary results of an ongoing study of systemic lupus erythematosis in Nogales, Arizona.

Lead Poisoning-Epidemiology

EHHE/HSB staff participated in the Environmental Health Workgroup (EHWG)-Lead initiative in the Border XXI EHWG meeting, presenting the results of pediatric lead-hazard investigations conducted during the year. NCEH also helped to develop future plans for work related to lead poisoning issues in the area.

Lead Poisoning-Laboratory

LS/NBB staff provided oversight and field support for the Mexico Border Lead Study, including developing protocols, conducting

training, and maintaining quality assurance. NCEH also consulted with the Director of the Department of Environmental Health in Mexico City about pediatric lead hazard investigations being carried out on the U.S.-Mexico border by the Secretaria de Salud. The Blood Lead Laboratory Reference System (BLLRS) program provided whole blood materials with certified reference materials for blood-lead analysis to Mexican laboratories. NBB provided training and technical assistance for collecting finger stick and earlobe blood specimens and for blood lead analyses needed for the Atzompa, Mexico, Study.

NBB collaboration in these activities enabled Mexican health officials to ensure the quality of their blood lead testing in a number of important surveys throughout the country.

Lead Poisoning-Training

EHHE/LPPB also participated in a symposium held in Juarez, Mexico, on lead poisoning prevention. Topics presented included the use of both the new technology instrument for blood lead analysis and the anodic stripping voltometry (ASV) instrument that CDC has been using for analysis of environmental samples for lead. Both laboratorians and field staff were trained in the use of these instruments and in the protocols for collecting blood and environmental samples.

This activity involved direct training by NCEH staff in a new technology. This technology will enable investigators in other countries to improve their capacity to perform blood lead surveys.

Natural Disasters

In collaboration with PAHO, EHHE/HSB conducted a 1-week course on epidemiologic methods in disaster settings, which was held February 16-20, 1998.

This training will help increase the epidemiolgic capacity of Mexico to respond to natural disasters and will leverage NCEH expertise in the technical programming of one of CDC's valued global partners, PAHO.

Neural Tube Defects

Clusters of cases of neural tube defects (NTDs) have been identified in several U.S.-Mexico Border communities during the past decade. The goals of this initiative are to document and reduce the prevalence of NTDs on both sides of the border and elsewhere in Mexico. In the first phase, available surveillance data on NTDs from border states, and border "sister cities" and data from other areas in Mexico will be collected using "capture-recapture" techniques to estimate the prevalence of NTDs. In the second phase, baseline folate intake along the U.S.-Mexico Border will be evaluated from the most recent Mexican National Nutrition Survey. Community-based projects will be undertaken to educate reproductive-age women about good dietary habits and the protective effects of high folate intake. Blood folate levels will be monitored in women of child-bearing age. In the third phase, the feasibility of case-control etiologic studies will be explored in Tamaulipas and other border states to continue to look for other environmental causes of NTDs. Mexico and the United States have been working together for the last 2 years to enhance the surveillance system along the border. During FY 1998, some training activities were undertaken and developed to collect, standardize, and distribute birth defects surveillance data.

Standard case definitions for anencephaly, spina bifida, and encephalocele were developed.

This NCEH collaboration with Mexican counterparts to study NTDs along the border will have several types of impact, including direct impact on the health of Mexican and U.S. women and children. The information we gain about NTDs in these areas will be used to allocate resources and further improve services. This collaboration also has as a goal increasing the capacity of local health personnel. Lessons learned on both sides of the Border will be helpful for reducing the number or cases of NTDs in both countries.

Urban Health: Air Pollution

Since 1995, NCEH has been involved with the U.S. Environmental Protection Agency (EPA) in evaluating environmental health problems along the U.S.-Mexico border. EHHE/APRHB has been involved in discussions with counterparts at EPA and in Mexico in developing a research agenda for the border, including the El Paso-Juarez area and the San Diego-Tijuana area.

The evaluation of health problems will directly lead to increased knowledge of environmental health problems in the area of study and will lead to the development of a research agenda for addressing environmental health problems along the border. In addition, lessons learned in this study can be useful in other parts of the United States. Since air pollution freely crosses boundaries, lessons learned in this part of the nation could be applied to other areas of the country plagued by air pollution problems.

Urban Health: Gasoline Exposure

NCEH scientists collaborated with investigators from the PAHO and the Mexican Ministry of Health to evaluate exposure of workers in Mexico City to key gasoline-related compounds, volatile organic compounds (VOCs), including benzene and toluene. Due to its location in a basin between mountains of the Central Plateau, the proliferation of automobiles as a major means of transportation, and extended commuting times, Mexico City has one of the worst air pollution problems of any city in the world. Much of this pollution is due to elevated levels of VOCs, a class of chemicals with known carcinogenic and central nervous system effects.

NCEH researchers and their collaborators have examined the internal dose levels of VOCs in the blood of nonsmoking gas station attendants, street vendors, and office workers in Mexico City. VOC levels were measured both at the beginning and the end of exposure, and these results were compared to the blood levels found in nonsmoking participants in the Third National Health and Nutrition Examination Survey (NHANES III) in the United States (1988-94). Significant elevated levels of benzene, toluene, ethylbenzene, m-/p-xylene, and o-xylene were found in the blood of gas station attendants and street vendors. Of great concern was that office workers, whose chief source of exposure is most likely their daily commute and breathing outside air, also had elevated levels of benzene, toluene, ethylbenzene, m-/p-xylene, and o-xylene. These findings point to the need for further efforts to reduce pollution in Mexico City and other cities with heavy vehicular traffic in order to protect citizens from elevated exposure to potentially toxic chemicals.

This study resulted in findings that can ultimately have an impact on the health status of residents of Mexico City. Study results may be the impetus for changes in policy by pointing to the need for further efforts to reduce pollution in Mexico City and other cities with similar air pollution problems. Finally, as large U.S. metropolitan areas grow, traffic congestion will continue to worsen, potentially resulting in conditions similar to those in Mexico City. We must address these concerns now in order to prevent the elevation of internal dose levels of toxic and carcinogenic compounds, such as those already seen in Mexico City.

Peru

Developmental Disorders

Peru's Foreign Communication Division contacted CDDH/DD to request help in analyzing Peru's health survey data. NCEH provided information to Peru on survey data analysis and also shared some of the surveys NCEH is currently conducting.

NCEH's interaction with Peru will be useful in the restructuring of Peru's national health-care system, requests for funding, and multilateral and World Bank collaborations in health and development. Currently, although surveys are undertaken in Peru, they are seldom analyzed or used to improve the national health-care delivery. NCEH collaboration can help leverage the analysis and use of survey data. Increasing local capacity for scientific data analysis and generating baseline information on health-care structure and selected conditions is important to Peru's initiatives for surveillance of emerging conditions.

Laboratory Standardization: Lead

LS/NBB provided laboratorians in Peru with four sets of whole blood materials with certified target values for lead to improve analytical accuracy and precision.

This collaboration enabled Peruvian laboratorians to ensure the quality of their own blood lead testing within the context of clinical care and public health programming in the country.

Lead Poisoning

A PAHO staff member, supported by EHHE/HSB, met with the Director of the Environmental Health Division of PAHO, the director of the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS), and different staff members of CEPIS to discuss current and future collaboration between NCEH and PAHO.

In addition, the PAHO staff member met with staff of the environmental program of the USAID mission in Lima, Peru, and accompanied by personnel from the General Directorate of Environmental Health, Ministry of Health, Peru, made a field visit to Callao, an area with lead contamination where a project funded by USAID is being conducted.

These meetings will help to determine future collaborations between CDC and PAHO countries.

Natural Disasters

Since September 1997, NCEH has had the technical lead role in responding to health issues arising from the 1997 forest fires in Southeast Asia. A meeting was held in Peru to discuss issues relating to the forest fires in

Southeast Asia, and, with other international researchers to evaluate the effects of forest fires on human health and the environment.

Recent fires affecting Texas, Florida, and California highlight the importance of this issue in the United States as well. Collaboration with researchers from other countries will have a direct impact by providing new knowledge about the health effects of air pollution caused by forest fires that can be applied in the United States. Further, this collaboration will complement the work of Asian counterparts and will help increase capacity and training development.

Trinidad

Laboratory Standardization: Lead

LS/NBB provided laboratorians in Trinidad with four sets of whole blood materials with certified target values for lead to improve analytical accuracy and precision.

This collaboration enabled Trinidad laboratorians to ensure the quality of their own blood lead testing within the context of clinical care and public health programming in the country.

Uruguay

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials andperformance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality assurance program, LS/CBB provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, and phenylketonuria screening tests to Uruguay's neonatal screening laboratory. Data analyses wereperformed and reports were developed for this laboratory.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Venezuela

Natural Disasters

In August 1998, PAHO contracted CDC as a WHO Collaborating Center to conduct workshops on documenting the effects on the health sector of the weather phenomenon El Niño in seven severely affected countries in the Americas. Topics to be addressed in the national report were previously agreed upon by PAHO and CDC. The second of these workshops was conducted in Caracas, Venezuela, where El Niño caused flooding and drought in various areas of the country.

This activity helped evaluate the surveillance system of Venezuela. This activity will enable Venezuelan public health officials to be better prepared to address future weather-related natural disasters that may occur.

Asia & Pacific

NCEH FY 1998 Collaborations in Asia & the Pacific

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Australia

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials andperformance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated; computer programs for data analyses have been developed, dried blood spot materials have been distributed; reported data have been analyzed; and reports have been developed for these laboratories.

As part of an international quality assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance evaluation materials for congenital hypothryoidism, phenylketonuria, galactosemia, and congenital adrenal hyperplasia screening tests to Australia's six neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.

NCEH also conducted performance evaluations for HIV antibody testing on dried-blood- spots in Randwick/New South Wales and Fairfield/Victoria. Quality-control material have been validated and distributed to assist in determination of seroprevalence among child-bearing women.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from these and future studies are comparable to other epidemiological studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984 the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of National Institutes of Health (NIH). The goal of the Lipid Standardization Program (LSP) is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with accuracy and precision needed for the detection, treatment, and prevention of cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Flinders Medical Centre, Bedford Park Institute of Medical and Veterinary Science, Adelaide, Australia.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. Standardization of these laboratories ensures that the data produced from future studies are comparable to other epidemiological studies conducted in the United States and globally.

Developmental Disorders

Several recent studies have shown that the long known association of cerebral palsy (CP) with multiple gestation did not decrease during the 1980s. Two recent trends have focused attention on the high risk of CP in

children from multiple gestations. The first is the increase beginning in the 1970s in neonatal survival rates in low and very low birth weight babies. Multiple births contribute a disproportionate percentage to these birth weight categories which are known to be associated with a high risk of CP. The second is the widely reported increase in rates of multiple births in recent decades. Although populations from one center are adequate to show such trends, any stratification of the populations in order to test specific hypotheses is thwarted by small numbers. Therefore, CDDH/DD scientists are collaborating with Australian researchers on a multi-center study.

NCEH's participation in this study will lead to further knowledge of the possible association between multiple births and CP. In addition, this participation will allow for more stratification than could be accomplished in the United States alone. Study results should ultimately benefit Australia, the United States and other countries around the world.

Laboratory Standardization: Lead

LS/NBB provided laboratorians in Australia with four sets of whole blood materials with certified target values for lead, to improve analytical accuracy and precision.

This collaboration enabled Australian laboratorians to assure the quality of their own blood lead testing, within the context of clinical care and public health programming in the country.

Bangladesh

Health Surveillance

In April 1998, an EHHE/SPB staff member provided technical assistance to USAID and EPA in carrying out the first of four comparative risk assessment workshops in Bangladesh. In determining the priority areas for targeted intervention, it is vital to assess and to rank the perceived risk of the consumers of service, the public.

This activity helped enable Bangladeshi researchers to carry out environmental risk assessment, which in turn will lead to better determination of priority areas for interventions.

Brunei

Natural Disasters

Since September 1997, NCEH has been the technical lead role in responding to health issues arising from the 1997 forest fire situation in Southeast Asia. Although funding did not materialize for the acute emergency response, NCEH continued its participation in the Interagency Working Group (IWG) for the Southeast Asia forest fires. In February 1998, under the aegis of the IWG, the Government of Malaysia requested studies related to cardiac and respiratory outcomes arising from the 1997-1998 fires.

The objectives for this activity were the following: 1) to review the scope of investigations that have been conducted in the region to date, including those done in Malaysia, Singapore and Brunei; 2) to determine where CDC-involved investigations could complement existing studies, as recommended by WHO;

3) to meet Southeast Asian counterparts and establish rapport for a collaborative relationship; and 4) to establish a long-term partnership.

EHHE/HSB and APRHB staff attended meetings dealing with forest fires and their health and will continue to work with the ministries of health to better evaluate health effects of air pollution caused by forest fires using both existing data and new data.

Recent fires affecting Texas, Florida, and California highlight the importance of this issue in the United States and worldwide. This research collaboration will enhance our understanding of a public health problem of interest to the United States and will help strengthen health research capacity in-country through direct NCEH collaboration.

China

Asthma

An EHHE/APRHB staff member presented a paper at the annual meeting of the CDC-Beijing Medical University (BMU) Collaborative Project on Birth Defects and Disabilities Prevention about the possibilities of conducting asthma surveillance within the framework of the birth defects surveillance system.

The discussions on asthma in China included reports on: 1) a 12-month prevalence of self-reported asthma symptoms from six project sites in China 2) NHLBI asthma treatment guidelines, which are known by the specialists in the large cities but are applied on the basis of available technology and the patient's ability to pay. If patients cannot pay for recommended medications, doctors will find less expensive, but similar, Chinese drugs. A discussion of measuring asthma severity within the context of surveillance did not yield avenues of fruitful endeavor. None of the U.S. standard measures (e.g.,mortality records, hospitalization, emergency care) would work. For example, children who die at home are not brought into the medical care system although, in villages, a doctor will visit the home. Causes of home deaths mentioned included traffic accidents and carbon monoxide poisonings. The Chinese considered the following as risk factors for asthma: 1) low birth weight, 2) vitamin A deficiency occurring in infancy, and 3) infection occurring in infancy. All believe that asthma surveillance is feasible, but they are concerned about identifying appropriate diagnostic criteria.

Clearly, much has been accomplished with birth defect surveillance for a relatively modest cost, but with much effort and a significant organizational commitment over many years. There is reason to think that the same could be true for asthma surveillance. Educating providers and developing a workable diagnostic criteria and case definitions would be essential. These tasks are difficult in the United States and will be many times more difficult in China. Nonetheless, given existing technology there, training should be possible that will, over time, increase diagnostic ability and quality of care and allow appropriate surveillance.

This activity may ultimately have direct impact on the health of Chinese children with asthma, may lead to surveillance patterned after that in the United States, and will have domestic impact by improving our understanding of this important health problem.

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital

hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried-blood-spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, and phenylketonuria screening tests to China's neonatal screening laboratories located in Qingdao City and Shanghai. Data analyses were performed and reports were developed for these laboratories.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from futures studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health (NIH). The goal of the LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for the detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Fu Wai Hospital, Beijing, the Beijing Institute of Geriatrics, Beijing, and the Guangdong Provence Cardiovascular Institute, in Guangzhou, China.

In addition, a senior NLS staff member visited Shanghai as a member of the Committee for the USA-China Collaborative Population Study of the North and South China Groups. He assisted in developing a protocol to study lipoproteins and to establish a lipid standardization program for laboratories in Guangzhou and Beijing, China.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Developmental Disorders

From 1991-1996, NCEH's Division of Birth Defects and Developmental Disabilities (BDDD) collaborated with Beijing Medical University (BMU) on a community intervention project to prevent neural tube defects by providing all women of reproductive age with periconceptional supplements of 0.4 mg per day of folic acid

alone, without using other vitamins. Through this collaboration, in April 1996, BMU requested the assistance of other scientists in BDDD in conducting studies of the prevalence, risk factors, and evaluation of computerized tomographic (CT) scans of children with cerebral palsy (CP) in seven cities of Jiangsu Province. Since 1996, technical assistance has been provided to BMU through telephone, e-mail and regular mail contact. In May 1997, a delegation from BMU and the Office of the Minister of Health visited CDC and met with a BDDD scientists to further discuss the CP study .

The CP study is nearing the completion of the data-collection phase. BMU requested that this NCEH scientist travel to Beijing in October 1998 in order to consult with BMU on CP and to make a presentation at the BMU Annual CDC Projects Meeting. During this visit, plans for further studies of CP in Beijing were presented by staff of BMU.

BMU has preliminary data on prevalence, risk factors, and CT findings for 455 children with CP. These data need further analysis and refinement before being presented in the scientific literature. The prevalence of CP in Jiangsu Province is low compared with its prevalence in other countries, including the United States.

BMU has requested CDC's continued assistance with CP studies, including implementing the proposal to begin on-going surveillance of CP through its national child health care surveillance system, which monitors the health of all children at key times during the first six years of life.

Beijing presents a unique opportunity to examine the population-based prevalence of and risk factors for CP in a large, relatively homogenous, highly compliant population. The infrastructure is in place to conduct CP studies of Chinese children. In addition, there is an opportunity for CDC to conduct a very high level of scientific inquiry related to cerebral palsy that could not be done in this country and to translate the findings from the China study to populations within the United States

This study will ultimately have both direct impact in China and domestic impact by advancing our understanding of CP. NCEH collaboration will further enable Chinese researchers to enhance their analytic skills.

Neural Tube Defects: Investigation

In 1993, CDC consulted with Beijing Medical University (BMU) staff about conducting and evaluating a community intervention program (CIP) of 0.4 mg folic acid for preventing neural tube defects (NTDs) on the basis of recommendations promoting the consumption of 0.4 mg folic acid for all newly married women of childbearing age who plan to marry in China. The last 3 years' activities for the cooperative partnership in China included finalization of the original Chinese pilot study; ongoing CDC/BMU support for maintaining an excellent birth defects surveillance system to monitor birth defect rates, including NTDs, and a revised project protocol to continue NTD prevention efforts by conducting and evaluating the community-intervention effort.

In addition, NCEH and Irish scientists provided consultation to BDPG and to Beijing Medical University (BMU) for evaluating hemoglobin-folate data generated by the BMU laboratory. A second paper describing the development and implementation of the hemoglobin-folate assay was submitted to the *American Journal of Clinical Nutrition.* A final paper describing the overall intervention study is in development, with a contribution from NCEH's laboratory.

In addition, CDDH and BDPG collaborated with Chinese colleagues in conducting the Chinese Community Intervention Program in 30 counties in Northern and Southern China, with a national program established in October 1995. The birth defect surveillance system has established the means to determine baseline and ongoing NTD rates. From 1992 through 1997, 575,000 births have been monitored, with over 12,000 cases of birth defects identified, including 851 NTDs.

Since October 1993, more than 90 percent of women having a premarital exam started taking folic acid pills. Through December 1996, more than150,000 women had started taking the pills, contributing more than 1,000,000 person-months of information. More than 20 million of the pills have been consumed. Compliance, as measured by pill counts, exceeds 85 percent.

BDPG staff will complete major papers on the final results of the evaluation and will evaluate the feasibility of conducting a randomizedcontrol trial (RCT) for the prevention of cardiac defects. CDC will consult with BMU to continue the program to promote the consumption of 0.4 mg folic acid per day by all women of childbearing age.

By participating with China in the study of NTDs and folic acid, NCEH has a direct impact on the studies that are carried out. This participation and the results that it produces will enable others to better manage resource allocation (e.g: folic acid fortification levels, folic acid dosage), and can lead to the development of programs that can be emulated by other countries, including the United States.

India

Health Surveillance

An EHHE/SPB staff member provided technical assistance to the U.S. Agency for International Development (USAID) and the U.S. Environmental Protection Agency (EPA) in carrying out a comparative risk assessment workshop in India during April 1998. This workshop was the first of four scheduled over the ensuing 12 months. In determining the priority areas for targeted intervention, it is vital to rank the perceived health risks of the public.

This participation trained Indian researchers in risk assessment. This assessment will lead to better determination of priority areas for interventions, that perhaps will be supported by USAID or EPA.

Lead Poisoning: Epidemiology

An EHHE/LPB staff member traveled to India to participate in an Indo-U.S. Conference on lead and other heavy metals in sensitive populations at high risk; met with representatives of UNICEF-India to discuss possible collaborations on lead poisoning in India and met with individuals and organizations already engaged in working on lead poisoning in India in order to be briefed on their activities and to discuss possible future collaborations, visited WHO study sites in Delhi, met with USAID representative to discuss possible inclusion of blood lead testing in the upcoming Indian DHS survey; and met with representatives of The George Foundation to discuss Project Lead-Free and to plan presentation of results.

This initial contact with Indian health officials involved in lead poisoning prevention will enable CDC to have a leveraging impact by helping set priorities for collaborative research.

Lead Poisoning: Laboratory

LS/NBB staff attended the Indo-U.S. Workshop on Lead and Other Heavy Metals in February 1998, which featured the new technology for blood lead measurement. NBB staff participated in discussions about relevant issues for lead monitoring and risk assessment. The introduction of the new technology is important to countries that can greatly benefit from a portable, precise, and accurate instrument whose use involves minimal expense and does not require a high level of skill to operate. In 1999 will again meet with Indian health officials to discuss other forms of blood lead analysis. India's laboratories will be added to the NCEH's Blood Lead Laboratory Reference System (BLLRS) program, in order to improve blood lead analytical accuracy and precision. In addition, a PAHO staff member sponsored by EHHE/HSB met with officials from the All Indian Institute of Medical Sciences (AIIMS) to discuss a lead screening project approach to gathering data on health status and exposure to heavy metals among women and children.

This above-mentioned technology and India's participation in NCEH's BLLRS will enable Indian scientists to standardize and ensure the quality of their measurements as they address the public health problem of lead poisoning in their country.

Japan

Cholesterol and Related Lipids: Cholesterol Reference Methods

In 1989, the U.S. National Cholesterol Education Program (NCEP) began an unprecedented campaign to educate the medical community and the general public about the risk factors for coronary artery disease (CAD). To identify individuals at risk for CAD, the NCEP recommended classifying patients using specific medical decision points for total cholesterol (TC), High-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG). Properly classifying a patient's risk on the basis of these medical decision points requires reliable and standardized measurements; therefore, NCEP also made accuracy and precision recommendations for clinical laboratories.

A practical approach to standardizing lipid and lipoprotein measurements is to ensure that diagnostic products are properly calibrated by the manufacturers and traceable to the accuracy base. NCEP has recommended that the reference methods run at CDC serve as the accuracy base for lipid and lipoprotein measurements. In 1990, CDC established the Cholesterol Reference Method Laboratory Network (CRMLN) to provide reference services to manufacturers and clinical laboratories. CRMLN laboratories use the CDC reference methods or designated comparison methods that are closely linked to the CDC reference methods. These laboratories are evaluated monthly by CDC to ensure that they meet the strict criteria necessary for interaction with manufacturers and the clinical laboratory community. Many countries outside the United States have adopted NCEP recommendations and have sought CDC's assistance in meeting them.

Osaka Medical Center for Cancer and Cardiovascular Diseases (OMC), in Osaka, Japan, is one institution that has requested assistance. This laboratory runs the reference method for cholesterol, the designated comparison method for HDL-C, the reference method for HDL-C, the reference method for LDL-C, and a CRMLN-standardized TG enzymatic method. OMC is the support center for lipid standardization in Japan and

provides lipid reference services in a domestic standardization program of Japanese clinical laboratories performing TC, HDL cholesterol, and TG. This program does not issue certificates. OMC also provides standardization for three epidemiological studies in Japan. This laboratory also certified six Japanese manufacturers of TC diagnostic products. In addition, 70 clinical laboratories were certified for TC through the CRMLN clinical laboratory certification program. OMC has certified five Japanese manufacturers of HDL-C diagnostic products and five Japanese manufacturers of LDL-C diagnostic products. A laboratory scientist from OMC attended the Annual Meeting of the CRMLN, held at CDC in May 1998. The OMC works with manufacturers who develop new technologies for measuring HDL-C and LDL-C. These new products have then been sold to other manufacturers who have incorporated them into their instrument systems that are then sold to clinical laboratories around the world, including the United States. It is important that these products meet the NCEP recommendations. In addition, this laboratory's assistance in standardizing laboratories participating in epidemiological studies in cardio- vascular disease and its treatment ensures that the results of these studies can be compared to the knowledge base from which the NCEP medical decision points were made.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health (NIH). The goal of the LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Osaka Medical Center for Cancer and Cardiovascular Disease, Osaka, Japan.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Laboratory Methods Development: Organic Toxicants

Japanese researchers worked in an NCEH laboratory for 1 month on analytical separation techniques. In addition, Japanese scientists visited the laboratory to consult on emerging technology for analyzing dioxins and polychlorinated biphenyls (PCBs). A LS/TB scientist also visited Japanese scientists at the Kyoto Institute of Technology

to consult on emerging technology in analyzing dioxins and PCBs. In addition, Japanese scientists brought newly developed and prototype chromatography products to the Emerging Technologies Laboratory for a 3-week on-site collaboration.

The research focused on three areas: 1) photolysis pathways of PCBs, 2) evaluation of new liquid chromatographic phases for the separation of PCB and dioxin congeners, and 3) prototype packing materials for capillary electrochromatography.

The development of new laboratory methods through this collaboration will have impact on the methods used in the United States.

Korea

Laboratory Standardization: Lead

LS/NBB provided laboratorians in Korea with four sets of whole blood materials with certified target values for lead to improve analytical accuracy and precision.

The laboratory reference materials enabled Korean collaborators to ensure the quality of their laboratory testing as they assess their own public health problems associated with environmental exposure to lead.

Korea-Democratic People's Republic

Complex/Humanitarian Emergencies

An EEHS/IERH medical epidemiologist assisted the U.S. Department of State and the Medical Assistance Program International (MAP International) to evaluate the effectiveness of previous drug and medical supply donations to the Democratic People's Republic of Korea (DPRK) on the basis of medical necessity, distribution, and effective use. The assessment produced findings about priority needs and made recommendations for future MAP involvement in the DPRK, including drug and medical supply needs, primary partners, and assessment and monitoring procedures.

NCEH technical expertise helped leverage humanitarian relief efforts of MAP International in the DPRK.

Malaysia

Environmental Health: Biomonitoring

A Malaysian scientist visited NCEH to explore establishing a biomonitoring laboratory in Malaysia for assessing human exposure to environmental pollutants. LS/TB staff provided the scientist with an overview of current functions of the toxicology laboratory and discussed what would be needed in Malaysia in terms of equipment and personnel, depending upon what objectives needed to be met in the proposed laboratory.

Concern about biomonitoring for environmental pollutants on an international scale should ultimately result in a decline in both local, national, and global pollution. Malaysia may ultimately decide to establish a biomonitoring laboratory, partly on the basis of recommendations from NCEH and other U.S. Government agencies.

Natural Disasters

Since September 1997, NCEH has had the technical lead role in responding to health issues arising from the 1997 forest fires in Southeast Asia. EHHE/HSB and EHHE/APRHB staff traveled to Malaysia and

Singapore during FY 1998 to: 1) review the scope of investigations that have been conducted in the region to date, particularly in Malaysia; 2) determine where CDC-involved investigations could complement existing studies, as recommended by WHO; 3) meet Malaysian counterparts and establish rapport for a collaborative relationship; and 4) establish long term partnerships.

In Kuala Lumpur, NCEH staff participated as observers in the Bi-Regional Workshop on Health Impacts of Haze-related Air Pollution, sponsored by WHO's Western Pacific Regional Office and the Southeast Asian Regional Office. The objectives of the workshop were to 1) review and summarize research findings and other relevant information concerning the impact of haze-related pollution on health; 2) identify needs for further technical information and research to support future decisions related to haze caused by forest fires; and 3) develop draft health-impact reduction measures and strategies, addressing inter-country cooperation issues, for consideration by affected countries and external support agencies. Using both existing and new data, NCEH will continue to work with the Health Departments of Malaysia, Singapore and Brunei to better evaluate health effects of air pollution caused by forest fires.

Recent fires affecting Texas, Florida, and California highlight the importance of this issue both in the United States and worldwide. Collaboration with counterparts in Asia will have public health impact in the United States by providing new information about the health effects of air pollution caused by forest fires. NCEH contributions will enable Asian counterparts to strengthen their analytic environmental health skills.

Mongolia

Developmental Disorders

A Mongolian epidemiologist visited CDC during summer 1998 to discuss opportunities for collaboration in various areas of health-care research. They identified a source of funding and contacted NCEH and other CDC scientists for technical assistance. CDDH/DD provided assistance in designing and developing the proposal on areas relevant to alcohol and substance use by women, contraception, and sexual risk behaviors. It is expected that once funding is confirmed, CDC scientists will provide assistance as resource persons to the training of study personnel and will provide scientific advice on the study. CDC does not have any formal existing contact with Mongolia in the health sector. Because most of the proposed projects require no external funding other than for travel of U.S. scientists to Mongolia, there is increased opportunity for CDC scientists to interact with Mongolian counterparts on a variety of issues.

Learning from health management and research projects in countries such as Mongolia, whose population is largely nomadic, is important for CDC as a way to increase its capacity to address global health issues. Such working experience and collaborative relationships will be relevant in addressing emerging health issues. The current study provides an opportunity to incorporate screening measures on alcohol use by pregnant women and to determine the extent of the problem. No data are now available on alcohol exposure among pregnant women in Mongolia or in most developing countries. This survey also provides an opportunity to standardize epidemiology methods on exposure to alcohol by pregnant women in developing countries.

In addition to the potential domestic impact of studies of alcohol-affected pregnancies in Mongolia, NCEH can leverage its technical expertise to enable Mongolian researchers undertake these studies.

Nepal

Natural Disasters

EHHE/HSB staff members presented three lectures (rapid needs assessment methods, risk assessment for estimating risks for deaths, and health surveillance systems in disasters) for an earthquake training program for the Ministry of Health of Nepal. The training program was entitled "Health and Medical Implications of Earthquake Disasters."

This presentation will increase the capacity of Nepal to respond to natural disasters.

New Zealand

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried-blood-spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality assurance program, LS/CBB provided dried-blood-spot quality-control and performance-evaluation materials for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, and maple syrup urine disease screening tests to New Zealand's neonatal screening laboratory. Data analyses were performed and reports were developed for this laboratory

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of the LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the National Womens Hospital, Auckland, New Zealand.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Environmental Health

Polychlorinated biphenyls (PCBs), dioxin, furans, and organochlorine pesticides are environmentally and biologically stable and, as a result, human exposure is chronic and widespread. Results of studies of highly exposed human populations show that dioxin produces developmental effects, chloracne, and increases in cancer. Results also suggest that these compounds may affect immune and endocrine functions.

NCEH laboratory scientists collaborated with scientists from New Zealand and assessed background exposure to dioxins, furans, PCB congeners, and pesticides. The results from 80 pooled serum samples have been sent to the New Zealand researchers and the results of the study are being prepared for journal publication.

Studies such as this contribute to our knowledge of the internal dose levels of these compounds in the general population. Biomonitoring for environmental pollutants on an international scale should ultimately result in a better understanding of the adverse health effects of environmental exposure to these compounds, and ultimately, establishing a stronger case for reducing global pollution.

Singapore

Natural Disasters

Since September 1997, NCEH has had the technical lead role in responding to health issues arising from the 1997 forest fires in Southeast Asia.

EHHE/HSB and EHHE/APRHB staff travelled to Malaysia and Singapore during FY 1998 to 1) review the scope of investigations that have been conducted in the region to date; 2) determine where CDC-involved investigations could complement existing studies, as recommended by WHO; and 3) establish long-term partnerships. Using existing and new data, NCEH will continue to work with the health departments in Malaysia, Singapore and Brunei to better evaluate health effects of air pollution caused by forest fires.

Recent fires affecting Texas, Florida, and California highlight the importance of this issue in the United States and worldwide. This collaboration will have an impact on U.S. public health by providing new information about the health effects of air pollution caused by forest fires. NCEH contributions will also enable Asian counterparts to strengthen their analytic environmental health skills.

Taiwan

Asia-Pacific Economic Cooperation

Since 1995, the U.S. Government has been leading an effort within the Asia Pacific Economic Cooperation (APEC) to address more effectively the challenges posed by emerging infectious diseases (EID) to the well-being and sustainable economic growth of the region. Due at least in part to the ad

hoc manner in which APEC took shape, health issues have only been minimally addressed. However, steady progress has been made on this issue, through working with the Industrial Science and Technology Working Group (ISTWG). A NCEH staff member has been a member of the U.S. Delegation to APEC/ ISTWG since 1995, representing health interests on behalf of the U.S. Government, including representing the United States at the 14th ISTWG meeting in Taiwan in March 1998.

The overall goal of this participation is to capitalize on the unique characteristics and strengths of the APEC forum to help address selected global health concerns. Health projects linked to disasters and environmental priorities represent a second important priority within APEC/ISTWG, in addition to that already established for EIDs. In both instances, it has been important to articulate the links between health and sustainable economic development, including trade and investment, within the Asia Pacific region and hence to highlight the relevance of these selected health issues within APEC.

EIDs and selected environmental health concerns represent problems of shared health and economic concern to APEC economies. Although the adverse outcomes are expressed in health terms, some of the underlying causes, solutions, and justifications for regional and global action come from outside the health sector. As a forum organized around larger scale economic and trade interests, APEC can stimulate action for such health problems in ways that the health sector rarely has the opportunity or leverage to do.

Furthermore, the APEC forum regularly convenes heads of state, ministers of foreign affairs, and ministers of science and technology to address APEC priorities. Such meetings offer opportunities to raise the visibility of selected health issues within APEC. Finally, the "Science and Technology" (S&T) focus offered through ISTWG is a further opportunity to try to harness S&T solutions to selected health issues, such as EIDs (e.g., through use of biotechnology) and selected environmental health problems (e.g., through use of geographic information systems linking environmental monitoring to health surveillance data), in ways that the health sector alone rarely succeeds in doing.

Although the environmental agenda has been prominent within ISTWG for at least the past three years, health related to the environment had not been addressed explicitly until the United States submitted the project at the 15th ISTWG which was convened in order to assess and identify ways to prevent health problems arising from forest fires in Southeast Asia. The principal study, to be funded by the State Department, will take place primarily in Malaysia and will be led by CDC.

This CDC/NCEH engagement offers opportunities to raise the visibility of selected health issues within APEC.

Laboratory Standardization: Lead

LS/NBB provided laboratorians in Taiwan with four sets of whole blood materials with certified target values for lead to improve analytical accuracy and precision.
This collaboration enabled Taiwanese laboratorians to ensure the quality of their own blood lead testing within the context of clinical care and public health programming in the country.

Thailand

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried-blood-spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for congenital hypothyroidism and phenylketonuria screening tests to Thailand's neonatal screening laboratory. Data analyses were performed and reports were developed for this laboratory.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Vietnam

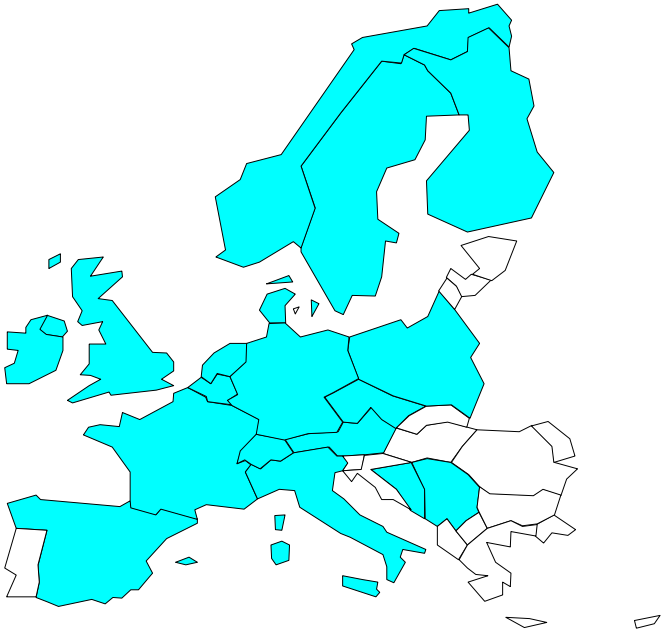
Complex/Humanitarian Emergencies

In May 1998, an Epidemiology Programming Office (EPO) EIS officer, through EEHS/IERH, assessed the health status and health service needs in four provinces of Vietnam on behalf of Doctors of the World (DOW).

The objective of the assessment was to identify areas for possible future health interventions by DOW. The priority recommendations included the need to focus on strengthening primary health care and re-orienting health professionals towards comprehensive patient management and health promotion.

Europe

NCEH FY 1998 Collaborations in Europe



CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Austria

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for congenital hypothyroidism and phenylketonuria screening tests to Austria's neonatal screening laboratory. Data analyses were performed and reports were developed for these laboratories.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Belgium

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health (NIH). The goal of LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Europe Zaventem Bioanalytical Research Corporation, Gent, Belgium.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Bosnia

Complex/Humanitarian Emergencies-Evaluation

EEHS/IERH evaluated the health services currently available within the reconstruction areas in Bosnia on behalf of the International

Medical Corps (IMC). The evaluation report provided timely and reliable information that was used to develop a proposal that was submitted to the European Community Humanitarian Office (ECHO).This consultation helped leverage the European Community's humanitarian assistance to Bosnia.

Complex/Humanitarian Emergencies-Presentation

In June 1998, an EEHS/IERH staff member presented a paper titled "Vaccinations During Complex Emergencies" at an international conference on immunizations in the former Yugoslavia.

Presentation of specific operational recommendations for humanitarian emergency response leverages NCEH experience in humanitarian/ complex emergencies by presenting this information to a wide range of future responders.

Czech Republic

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, and phenylketonuria screening tests to the Czech Republic's neonatal screening laboratory. Data analyses were performed and reports were developed for this laboratory.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Institute for Clinical Experimental Medicine, Prague, Czech Republic.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory insures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Denmark

Developmental Disorders

A large body of evidence is emerging which suggests that infection of the reproductive tract is an important cause of premature birth. Additional evidence suggests that concurrent fetal infection may lead to fetal brain damage and subsequent serious neurological impairment and disability, such as cerebral palsy (CP). Researchers in the Developmental Disabilities Branch (DDB) of CDDH and the Danish Epidemiologic Sciences Centre (DESC) have recently established a partnership to investigate these issues.

One objective of the collaboration is to assess whether specific markers of infection (primarily Interleukin [IL]-1 , tumor necrosing factor [TNF]-alpha , IL-6 and IL-10) obtained from maternal serum collected during pregnancy permit identification of women at risk for spontaneously induced preterm delivery. A second objective is to assess whether these markers in maternal sera and the cord blood of newborns are also associated with an increased risk for CP and other adverse neurologic outcomes in exposed offspring, regardless of their gestational age. To achieve these objectives, researchers will obtain data from two Danish prospective cohort studies, the Odense Cohort (OC) and the Danish National Birth Cohort (DNBC). The OC consists of a completed Danish regional cohort of 3000 pregnant women enrolled in a study of the microbiologic causes of prematurity, and for which a nested case-control study of preterm delivery has been performed; the DNBC, administered by the DESC, is a study of 100,000 pregnant women in which all pregnant women in Denmark between 1997 and 2001 will be invited to participate.

Initial testing of the present study's hypotheses concerning infection and preterm delivery will be performed on data already collected from the OC. On the basis of analyses from the OC, revised hypotheses concerning infection and preterm delivery can be tested on data currently being collected as part of the DNBC. To investigate the study's additional hypotheses concerning infection and CP, NCEH will work with the DESC to conduct surveillance for cerebral palsy among all births in the DNBC .

The goal of this effort is to identify specific markers of infection during pregnancy that could be used to identify women at risk for premature delivery or for having a child with cerebral palsy. If these women can be identified early, then appropriate treatment may be given before harm to the fetus occurs.

By helping to improve understanding of possible prematurity and developmental disorders associated with gestational reproductive tract infection, opportunities for prevention may be identified which could clearly be relevant to addressing these issues in the United States.

Environmental Health

Published literature, some from the United States, indicates that exposure in utero to certain environmental pollutants (e.g. DDT, PCBs) results in a lower birth weight than average, depressed scores on the Brazelton Scales, poorer visual recognition, lower IQ

scores, and reduced reading comprehension. Denmark's Faroese population is unique for such a study replication because 1) they rely heavily on fish and whale for their diet, and these are dietary sources for a variety of organopollutants, and 2) Faroese women have low rates of alcohol consumption and smoking, which are known confounders for having an impact on the health of the fetus. The objective of this study was to determine whether women who consume large amounts of seafood and are therefore exposed to certain environmental pollutants, give birth to children who score low on neurobehavioral examinations in later years. Umbilical cord blood was analyzed for methyl mercury, umbilical cords were analyzed for PCBs, and the children (now 7 years old) were evaluated. This study will also examine serum from 200 children. Neurobehavioral examinations on the children indicated that a reduction in certain test scores was associated more with exposure to methyl mercury than with exposure to PCBs.

Recommendations from the study include the following: 1) generate more health-effects studies to clarify further the roles of methyl mercury and PCBs in child development, 2) reevaluate earlier U.S. data, 3) enhance monitoring programs to determine the levels of these types of compounds in food, and 4) possibly restrict dietary intake of certain foods by pregnant women.

The associations between methyl mercury and organic toxicants with child developmental disorders is relevant to the United States, particularly the Great Lakes area. Though further study is recommended, this study has helped improve our understanding of the issues, which can result in using specific prevention approaches in the United States and elsewhere.

Pesticides

Breast cancer is the most common cancer among women in many western countries. Some organochlorine compounds may have weak estrogenic effects and, therefore, suspected of increasing the risk for breast cancer. In Denmark, approximately 14% of all women develop breast cancer with the incidence more than doubling in the last 30 years.

LS/TB scientists investigated whether women with high serum concentrations of potentially estrogenic compounds are at increased risk for breast cancer. Stored serum from Danish women who later developed breast cancer was analyzed for PCBs and pesticides. The findings from this study support the hypothesis that exposure to xeno-estrogens may increase the risk for breast cancer.

This study provided information about a problem facing Danish women, as well as women in the United States. The results supported the hypothesis of a link between exposure to xeno-estrogens and increased risk for breast cancer. Armed with this knowledge, policy makers both here and abroad may push for a reduction in environmental pollution.

Finland

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control

materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for congenital hypothyroidism, phenylketonuria, and congenital adrenal hyperplasia screening tests to Wallac Oy and Labysystems Oy, Finnish manufacturers of reagent kits used for newborn screening tests. Data analyses were performed and reports were developed for these laboratories. CBB also worked with Finnish scientists to standardize measurements of thyroid hormone worldwide.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

France

Asthma

EHHE/APRHB staff attended the annual *Lancet* meeting in October 1997 and presented a paper at this meeting. Asthma prevalence is rising throughout the industrialized world, not only the United States. At this *Lancet* conference, participants discussed a variety of perspectives on the epidemic as well as plans for curbing the epidemic.

These discussions were directly relevant to U.S. plans for addressing the asthma epidemic.

Birth Defects

Genetic studies have evolved from the simple analysis of single genes to include more sophisticated analyses of complex traits, an evolution that parallels an increasing recognition of the role of gene-environment interactions in disease etiology. Genetic factors probably contribute to virtually every human disease, conferring susceptibility or resistance, or influencing interaction with environmental factors. In addition to their use in studies of examining gene-environment interactions in human complex traits, genetic studies have increasingly been used to examine the effects of gene-gene interactions in disease etiology. CDDH and BDPG research demonstrates that the case-only design is a valid approach to measuring the effects of gene-gene interactions.

At the International Genetic Epi Society Conference in France in September 1998, BDPG staff presented their findings demonstrating that, for assessing gene-gene interaction in the etiology of a disease, investigators can use a case-only design if the two genes under study are in linkage equilibrium. Although they presented the case-only design in the context of gene-gene interaction, the algebraic relation involved applies to any two factors that are distributed independently in a population whose cases are identified or sampled in proportion to their occurrence. Assuming the genes under study are not in linkage disequilibrium, the case-only design is a valid approach for measuring gene-gene interaction in the etiology of a disease. Like studies of gene-environment interactions, studies of gene-gene interactions require fewer case subjects to measure gene-gene interactions if they use a case-only design rather than a case-control design.

Increasingly, investigators are searching for gene-gene interactions in human complex traits. With the rapid progress in molecular technology and the Human Genome Project (HGP), there will be increased interest in searching for the effects of gene-environment and gene-gene interactions in disease etiology. BDPG staff presented a simple genetic epidemiologic method, the case-only design, as a useful tool with which to rapidly screen for these interactions.

The overall issue of genetics and disease prevention and the study of gene-gene interactions will have tremendous impact on public health both in the United States and worldwide. Further, NCEH's presentation at this conference allows other researchers to use the techniques and lessons learned from the NCEH presenters in their own research.

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, phenylketonuria, galactosemia, and congenital adrenal hyperplasia screening tests to France's two neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to data obtained from other epidemiological studies conducted in the United States and globally.

Vessel Sanitation Program

The Vessel Sanitation Program (VSP) was established in 1975 as a cooperative activity between CDC and the cruise ship industry to address the issue of sanitation aboard cruise ships. This program assists the industry in fulfilling its responsibility for developing and implementing comprehensive sanitation programs in order to minimize the risk for gastrointestinal diseases.

VSP also offers consultative services to the shipping industry, including reviewing plans for renovations and new construction of ships. In FY 1998, the program consulted with shipyard personnel in France. With 42 ships being built or renovated around the world from 1998 through 2001, the VSP has increased its commitment to working with the cruise ship industry to ensure that new and renovated vessels meet U.S. Public Health standards.

This program helps ensure the health of travelers, both United States and foreign, aboard cruise ships around the world.

Germany

Birth Defects: Neonatal Screening

NCEH has provided dried-blood spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated; computer programs for data analyses have been developed, dried blood spot materials have been distributed; reported data have been analyzed; and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria screening tests to Germany's six neonatal screening laboratories Data analyses were performed and reports were developed for these laboratories.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Insitut fur Klinische Chemie und Laboratoriumsmedizin, Munster, Germany.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Developmental Disorders: Fetal Alcohol Syndrome

The University of Bonn, Germany, under contract from the Federal Government of Germany, requested CDC assistance in formulating national guidelines on alcohol and health in 1998. CDDH/DD staff provided consultation through telephone calls, e-mails, and documents on current U.S. policies on alcohol and health, U.S./CDC programs to

prevent adverse effects of alcohol on health; research needs; and future directions. Various aspects of the discussion will be included in the expert committee report to the Government of Germany.

This report solicits funding for new research to study the adverse effects of moderate alcohol use among reproductive age women. Currently, scientific data in this area are inadequate. Increasing the interest in research in these areas and expanding the number of global partners involved in such activities is vital for the revising U.S. policies on alcohol use by pregnant and reproductive age women and for improving service delivery to assess and intervene in behaviors that involve alcohol abuse. These institutional relationships will facilitate the formulation of a global fetal alcohol syndrome (FAS) working group and will help in promoting a proposal to establish a World Health Organization (WHO) collaborating centre on FAS research at CDC.

This collaboration aided the government of Germany in formulating national guidelines on alcohol and health in part by sharing policies and research from the United States. In addition, such collaborations may lead to the formation of a WHO Collaborating Centre for FAS research at CDC, which would increase capacity to study this problem.

Pesticides

NCEH scientists continued their collaboration for assessing human exposure to organic toxicants with scientists at the University of Erlangen (Germany). NCEH scientists collaborated on inter-laboratory comparisons of polychlorinated biphenyls (PCBs) and chlorinated pesticide analyses. A laboratory at the University of Erlangen was the central laboratory for these studies because it is the National Reference Laboratory for Germany. The CDC laboratory met or exceeded all acceptance criteria and received full certification from the German Laboratory. The dioxin results and immune endpoints in a study of German BASF workers was published.

Inter-agency validation leads to increased capabilities of the German laboratories; validates the analytical capability of the U.S. laboratory for analyzing dioxins, PCBs, and chlorinated pesticides; and illustrates health effects from dioxin exposure, resulting ultimately in a decline in global pollution that will reduce U.S. environmental pollution and thus improve the health of U.S. citizens.

Vessel Sanitation Program

The Vessel Sanitation Program (VSP) was established in 1975 as a cooperative activity between CDC and the cruise ship industry to address the issue of sanitation aboard cruise ships. This program assists the industry in fulfilling its responsibility for developing and implementing comprehensive sanitation programs in order to minimize the risk for gastrointestinal diseases.

VSP also offers consultative services to the shipping industry, including reviewing plans for renovations and new construction of ships. In FY 1998, the program consulted to shipyard personnel in Germany. With 42 ships being built or renovated around the world from 1998 through 2001, the VSP has increased its commitment to working with the cruise ship industry to ensure that new and renovated vessels meet U.S. Public Health standards.

This program helps ensure the health of travelers, both U.S. and foreign, aboard cruise ships around the world.

Greece

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, and phenylketonuria screening tests to Greece's neonatal screening laboratory. Data analyses were performed and reports were developed for this laboratory.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory insures that the data produced from future studies are comparable to dat obtained from other epidemiologic studies conducted in the United States and globally.

Ireland

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, and phenylketonuria screening tests to Ireland's neonatal screening laboratory. Data analyses were performed and reports were developed for this laboratory.

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Italy

Birth Defects: Neonatal Screening

NCEH has provided dried-blood spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, phenylketonuria, maple syrup urine disease, and homocystinuria screening tests to Italy's neonatal screening laboratory. Data analyses were performed and reports were developed for this laboratory.

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Cholesterol and Related Lipids: Cholesterol Reference Methods

In 1989, the U.S. National Cholesterol Education Program (NCEP) began an unprecedented campaign to educate the medical community and the general public about the risk factors for coronary artery disease (CAD). To identify individuals at risk for CAD, the NCEP recommended classification of patients using specific medical decision points for total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG). Properly classifying a patient's risk on the basis of these medical decision points requires reliable and standardized measurements; therefore, NCEP also made accuracy and precision recommendations for clinical laboratories.

A practical approach to standardizing lipid and lipoprotein measurements is to ensure that diagnostic products are properly calibrated by the manufacturers and traceable to the accuracy base. NCEP has recommended that the reference methods run at CDC serve as the accuracy base for lipid and lipoprotein measurements In 1990, CDC established the Cholesterol Reference Method Laboratory Network (CRMLN) to provide reference services to manufacturers and clinical laboratories. CRMLN laboratories use the CDC reference methods or designated comparison methods that are closely linked to the CDC reference methods. These laboratories are evaluated monthly by CDC to ensure that they meet the strict criteria necessary for interaction with manufacturers and the clinical laboratory community.

Many countries outside the United States have adopted the NCEP recommendations and have sought CDC's assistance in meeting them. The San Raffaele Hospital Reference Laboratory, Milan, Italy, runs the reference

method for cholesterol and the designated comparison method for HDL-C. This laboratory has organized an external quality-assurance (QA) scheme for the GISSI Prevention Project. The scheme is based on frozen samples (3 events/year, 2 levels per event). About 100 laboratories participate in the program. San Raffaele Hospital Reference Laboratory prepares the samples, provides target values for TC and HDL cholesterol, and evaluates the data. The results of 4 year's work with the GISSI project were published in the peer-reviewed literature in 1997. In addition, two clinical laboratories were certified for TC through the CRMLN clinical laboratory program. This laboratory has developed a designated comparison method for TG, which is currently being standardized by the CDC-NHLBI Lipid Standardization Program. CRMLN intends for this method to be used in certifying the manufacturers of diagnostic products for measuring TG. A scientist from this laboratory attended the annual meeting of the CRMLN, held at CDC in May 1998. The San Raffaele Hospital Reference Laboratory's assistance in standardizing laboratories participating in epidemiological studies in cardiovascular disease and its treatment ensures that knowledge gained from these studies can be compared with the knowledge base from which the NCEP medical decision points were made. This laboratory's designated comparison method for TG (that will be standardized by the CDC) is a valuable contribution to the clinical laboratory community worldwide because it will provide a way for manufacturers and clinical laboratories to establish traceability to the TG accuracy base.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Complex/Humanitarian Emergencies

An EEHS/IERH staff member served as a consultant for the joint WHO/United Nations High Commission for Refugees (UNHCR) conference in Italy on caring for the nutritionally vulnerable during complex emergencies.

Through its participation, CDC leveraged its technical expertise by contributing to a UN conference addressing nutritional needs in the context of humanitarian emergencies.

Dioxin Exposure

In 1976, an industrial accident exposed a large population in Seveso, Italy, to substantial amounts of relatively pure 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD, or dioxin). Dioxin is environmentally and biologically stable and, as a result, human exposure is chronic and widespread. Studies of highly exposed human populations show that dioxin produces developmental effects, chloracne, increases in cancer, and suggest that it may also affect immune and endocrine functions.

NCEH scientists, in collaboration with Italian and University of California researchers, completed the analysis of 500 serum samples from Seveso, Italy women. This study was designed to assess any relationship between dioxin serum level and the development of endo-metriosis in these Italian women. The data have been sent to the Italian principal investigator for data analysis.

Scientists from Italy were trained in analyzing dioxin at CDC and then analyzed 1200 samples at the CDC facility. A collaborative

study was continued to study the relationship among dioxin exposure, health effects, and marker of susceptibility in the Seveso, Italy population. NCEH scientists, in collaboration with Italian researchers, found an altered sex ratio in children born to parents who were highly exposed to TCDD in Seveso. Several hundred additional serum specimens have been analyzed and reported to the principal investigator to determine whether a mother's or a father's level of dioxin is more responsible for the altered sex ratio.

Additional Seveso studies awaiting data analysis include dioxin levels and their relationship to immune endpoints and male reproduction. These results will be reported in 1999.

These studies contribute to our understanding of the human toxicity of TCDD and its long-term health effects on human populations. NCEH's contributions to this longstanding collaboration will ultimately have an impact on public health in the United States and worldwide.

Environmental Contamination: Fish

Human exposure to dioxins and furans is a matter of concern, especially in highly industrialized and crowded areas like the Venice lagoon. Since 1900, the mainland territory adjacent to Venice has been one of the largest industrialized areas of Italy, where many activities involving non-ferrous metals production, the chemical industry, and the incineration of municipal and hospital waste occur. These activities are located on the western border of the lagoon, only 2-3 kilometers away from an area where mussels and clams are harvested.

LS/NBB will participate in a study to examine the levels of fish contamination in conjunction with the high level of fish consumption in the area, and will evaluate the related hypothesis of a possible increase in body burden of dioxins among Venice residents and fishermen. During FY 1998 NBB staff provided field specimen-collection materials for proposed heavy metals, dioxins/furans, pesticides, and polychlorinated biphenyls (PCBs). Specimens will be received in early 1999 for analysis by NBB and other branches.

Studies to improve our understanding of health problems arising from environmental contamination of fish will have impact on public health in the United States Food safety and environmental contamination of freshwater fish is an issue in this country, particularly in the Great Lakes area. Studies to improve our understanding of health problems arising from environmental contamination of fish will have impact on public health in the United States.

Vessel Sanitation Program

The Vessel Sanitation Program (VSP) was established in 1975 as a cooperative activity between CDC and the cruise ship industry to address the issue of sanitation aboard cruise ships. This program assists the industry in fulfilling its responsibility for developing and implementing comprehensive sanitation programs in order to minimize the risk for gastrointestinal diseases.

VSP also offers consultative services to the shipping industry, including reviewing plans for renovations and new construction of ships. In FY 1998, the program consulted with shipyard personnel in Italy. With 42 ships being built or renovated around the world from 1998 through 2001, the VSP has increased its commitment to working with the cruise ship industry to ensure that new and renovated vessels meet U.S. Public Health standards.

This program helps ensure the health of travelers, both U.S. and foreign, aboard cruise ships around the world.

Netherlands

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried-blood-spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, and phenylketonuria screening tests to the Netherland's five neonatal screening laboratory. Data analyses were performed and reports were developed for these laboratories.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

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A practical approach to standardizing lipid and lipoprotein measurements is to ensure that diagnostic products are properly calibrated by the manufacturers and traceable to the accuracy base. NCEP has recommended that the reference methods run at CDC serve as the accuracy base for lipid and lipoprotein measurements. In 1990, CDC established the Cholesterol Reference Method Laboratory Network (CRMLN) to provide reference services to manufacturers and clinical laboratories. CRMLN laboratories use CDC reference methods or designated comparison methods that are closely linked to CDC reference methods. These laboratories are evaluated monthly by CDC to ensure that they meet the strict criteria necessary for interaction with manufacturers and the clinical laboratory community.

Many countries outside the United States have adopted the NCEP recommendations and have sought CDC's assistance in meeting them. The Lipid Reference Laboratory (LRL), University Hospital "Dijkzigt," Rotterdam,

The Netherlands, is a charter member of the CRMLN. This laboratory runs the reference method for cholesterol, the designated comparison method for HDL-C, and the reference method for HDL-C. The LRL has worked with manufacturers and other lipid-research laboratories to evaluate performance of HDL-C reagents and calibrators. The LRL performs targeting of frozen human serum used in national and international external quality-assurance (EQA) programs. The LRL has also developed a program for clinical laboratory certification of HDL-C in The Netherlands. This LRL serves as the core laboratory for several longitudinal epidemiological studies in The Netherlands. In addition, three clinical laboratories were certified for TC through the CRMLN clinical laboratory program. Dr. Christa Boersma-Cobbaert attended the Annual Meeting of the CRMLN, held at CDC in May 1998.

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Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of the Lipid Standardization Program (LSP) is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the University Hospital Dijkzigt, Rotterdam, the Netherlands.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Dioxin Exposure

Dioxin is environmentally and biologically stable, and as a result, human exposure is chronic and widespread. Results of studies of highly exposed human populations show that dioxin produces developmental effects, chloracne, and increases in cancer. Further, these results suggest that dioxins may also affect immune and endocrine functions. This study was designed to validate the exposure index derived by the International Agency for Research on Cancer in its attempt to correlate dioxin exposure and cancer.

LS/TB analyzed specimens for measuring dioxins and related compounds in the blood of chemical workers from The Netherlands. Collaborators published a manuscript that presents data showing that high occupational exposure to dioxins is associated with increased mortality from cancer.

These studies contribute to our knowledge of the human toxicity of TCDD (one particular

dioxin) and its long-term health effects on human populations. Increasing the knowledge base about international environmental pollution should ultimately result in a decline in global pollution, which will reduce U.S. environmental pollution and thus improve the health of populations of the United States and around the world.

Environmental Health

NCEH's Director participated in two important professional meetings in The Netherlands: the large Third International Pediatric Association (IPA) conference and the smaller Children's Environmental Health Section of the XXII International Congress of Pediatrics. The IPA conference hosted thousands of participants, including a substantial number from developing countries and from such areas as pediatric care and industry. This conference was opened by Dr. G. Brundtland, Director General of WHO, who discussed the importance of child health, nutrition, safe development, infectious diseases. She also discussed the importance attached to child health in the developing world. The second meeting, the Children's Environmental Health Section, included about 100-150 participants and was mainly geared toward developing a global children's environmental health network and strategies for advancing the children's environmental health agenda.

Discussions included strategies for linking health and environmental agencies and issues at the policy level and the possibility of developing an Internet-based Listserve to link interested professionals worldwide.

This issue is of vital importance not only overseas but also in the United States. NCEH's Director co-chaired the U.S. Government Interagency Task Force on Children and the Environment, which recommended four priority areas of focus within this large overall agenda. These meetings occurred just as the Task Force had developed itsrecommendations, thus permitting interface between U.S. Government policy and like-minded professionals interested in this issue on a global scale.

Vessel Sanitation Program

The Vessel Sanitation Program (VSP) was established in 1975 as a cooperative activity between CDC and the cruise ship industry to address the issue of sanitation aboard cruise ships. This program assists the industry in fulfilling its responsibility for developing and implementing comprehensive sanitation programs in order to minimize the risk for gastrointestinal diseases.

VSP also offers consultative services to the shipping industry, including reviewing plans for renovations and new construction of ships. In FY 1998, the program consulted with shipyard personnel in the Netherlands. With 42 ships being built or renovated around the world from 1998 through 2001, VSP has increased its commitment to working with the cruise ship industry to ensure that new and renovated vessels meet U.S. Public Health standards.

This program helps ensure the health of travelers, both U.S. and foreign, aboard cruise ships around the world.

Norway

Environmental Health: Risk Factors for Breast Cancer

Breast cancer is the most common cancer among women in many western countries. Some organochlorine compounds may have weak estrogenic effects and were therefore

suspected of increasing the risk for breast cancer. LS/TB investigated whether women with high serum concentrations of potentially estrogenic compounds are at increased risk for breast cancer. The study, funded by the Department of Defense in collaboration with NIOSH, for examining the relationship in Norwegian women between their serum levels of dioxins, furans, PCBs, and pesticides and breast cancer was completed. We reported 76 analytes (dioxins, furans, PCBs, and pesticides) in 300 case/control samples. Data are still being analyzed by NIOSH.

Using the same Norwegian serum bank, a collaborative study with National Cancer Instituite (NCI) was designed for studying the relationship between serum organochlorine pesticide and PCB levels and multiple cancers. Data analysis of these 2000+ serum specimens will begin in 1999.

Increasing our knowledge about environmental pollutants and specific adverse health effects should result in developing better evidence-based environmental policy.

Poland

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for congenital hypothyroidism and phenylketonuria screening tests to Poland's 11 neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the 1)Collegium

Medicum UJ, Kracow, 2)National Institute of Cardiology, Warsaw, Poland.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Laboratory Standardization: Lead

LS/NBB provided laboratorians in Poland with four sets of whole blood materials with certified target values for lead to improve analytical accuracy and precision. NBB staff also provided extensive specimen collection and laboratory methodology support for a planned National Cancer Institute (NCI) study of uterine cancer and human papilloma virus infection among Polish women at three clinical centers.

This collaboration enabled Polish laboratorians to ensure the quality of their own blood lead testing within the context of clinical care and public health programming in the country.

Spain

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, and phenylketonuria screening tests to Spain's two neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy

and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the 1)Laboratorio de Salud Pública, Delegación de Sanidad de Vizcaya, Bilbao, 2)Hospital de Galdakao, Vizcaya, Spain.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Toxic Oil Syndrome-Clinical

This activity is part of an ongoing commitment by CDC to help the country of Spain investigate Toxic Oil Syndrome (TOS) that occurred many years ago. Two studies were designed, including the preparation and submission of the study protocols for approval and clearance. These studies will document the long-term physical and neurological effects of TOS. As well, an NCEH investigator participated in committee meetings at the European WHO level to guide investigations of this problem.

These studies will increase our understanding of the long-term effects from Toxic Oil Syndrome.

Toxic Oil Syndrome-Laboratory

Toxic Oil Syndrome (TOS) occurred in Spain in 1981 and was associated with the consumption of an aniline-denatured rapeseed oil. The oil had been refined to remove the denaturant and then diluted with other oils and animal fats to produce an oil that was sold by itinerant salespeople and in markets near Madrid, Spain. More than 20,000 people eventually became ill during the epidemic, and nearly 800 died. Even with the body of evidence that indicates the oil as the causative agent in the epidemic, no particular contaminant in the oil has ever been associated with causing the syndrome.

NCEH scientists, in collaboration with the Spanish scientists, using data gathered from the studies of the past year and previous years, are developing a pattern-recognition method to formalize the associations of these new compounds with case-associated oils. Data analysis was completed in 1998.

NCEH laboratory scientists and Oregon State University (OSU) scientists collaborated to produce oils that are analytically similar to the oils that have been associated with causing the TOS epidemic. Through this collaboration, the scientists found conditions that consistently produced oils that contain chemical markers of the contaminated oils. In 1999 NCEH and OSU will scale up production of oils using these new conditions.

A NCEH scientist also traveled to Madrid, Spain, to collaborate with Spanish scientists on improving quantitation methods for the chemical components of the causative oils in the Toxic Oil Syndrome study. Accomplishments were an improved method to quantitatively measure markers of contaminated oils and identification of a new chemical component of the causative oils.

The goal of continued study into TOS is to understand what produced the toxic oils in 1981 so that a similar incident can be prevented from occurring in the future and to develop a pattern-recognition method in order to formalize the associations of these new compounds with case associated oils. Further advances in this study will directly impact the

health of populations around the world that consume rapeseed or other oils.

Urban Health

Half the world's population now lives in urban settings. Rapid, unplanned urbanization creates unhealthy environments. Urban environmental conditions giving rise to health problems include unsafe drinking water, inadequate waste management and sanitation, air and noise pollution, and crowding. Understanding and managing or overcoming these environmental conditions is critical to solving the associated health problems including infectious diseases, respiratory conditions, stress or violence, motor vehicle injuries, and chronic diseases. With a vision of "Healthy living in healthy cities," NCEH has established urban health and megacities as one of its five main global priorities in its global strategic plan, which was developed in FY 1998.

NCEH participated in the First World Congress on Health and the Urban Environment in Madrid in July 1998. This meeting presented a good opportunity to meet and network with key agencies that address the global urban environmental health issue. This conference brought together people from a broad range of disciplines, representing multiple sectors, and offered opportunities for sharing ideas among urban planners, architects, engineering specialists, health professionals, and others. Sectors included national and local government, multilaterals (UN), academia, NGOs, non-profit organizations, the private sector; and health, urban development, water/sanitation systems, transport, industrial, and other sectors. Although a conference format does not lend itself to achieving or assessing consensus, we believe that implicit consensus was reached on the importance of multidisciplinary, multisectoral engagement on issues related to health and the urban environment.

Following are some of the key points from the meeting: 1) increasing urbanization worldwide — 50% urban by 2000; 2) poverty & disparities — disproportionate urban growth & health problems among the poor; 3) desire for foreign capital has led to governments' abandoning positive social policies and environmental protection, resulting in environmental degradation and poor health, especially among urban poor populations; 4) environmental infrastructure investments improve health and in turn strengthen the overall economy. Additional issues and themes from the conference were 1) social responsibility, human rights; 2) intra-urban disparities in health status; 3) the changing role of local governments; 4) the importance of community participation; 5) interventions to improve physical environment, and their health implications; and 6) children living in cities.

Urban health and megacities clearly represent an emerging global health issue that is also relevant to public health in the United States. The next conference on this subject is tentatively scheduled for July 2000, with final details on date and location still pending. Because this is one of NCEH's new strategic global priorities, we plan to participate in this conference and have offered to help with its planning.

Vessel Sanitation Program

The Vessel Sanitation Program (VSP) was established in 1975 as a cooperative activity between CDC and the cruise ship industry to address the issue of sanitation aboard cruise ships. This program assists the industry in fulfilling its responsibility for developing and implementing comprehensive sanitation

programs in order to minimize the risk for gastrointestinal diseases.

VSP also offers consultative services to the shipping industry, including reviewing plans for renovations and new construction of ships. In FY 1998, the program consulted with shipyard personnel in Spain. With 42 ships being built or renovated around the world from 1998 through 2001, the VSP has increased its commitment to working with the cruise ship industry to ensure that new and renovated vessels meet U.S. Public Health standards.

This program helps ensure the health of travelers, both U.S. and foreign, aboard cruise ships around the world.

Sweden

Birth Defects: Neonatal Screening

An LS/CBB staff member was a member of the organizing committee for a meeting held in Stokholm, Sweden, of the Task Force for Quantitation of Antigen Expression sponsored by the European Working Group on Clinical Cell Analysis.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health (NIH). The goal of LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the University of Uppsala, Uppsala, Sweden.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making .The standardization of this laboratory insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Switzerland

Air Pollution

A PAHO staff member, supported by EHHE/HSB, participated in the Task Group Meeting on WHO Guidelines for Air Quality at WHO Headquarters in Geneva, Switzerland, in December 1997. She presented a review of air pollutant levels and the health effects of air pollutants in Latin American countries to be included in the WHO Air Quality Guidelines.

Participation with WHO will lead to the development of Air Quality Guidelines that will be used worldwide.

Birth Defects: Neonatal Screening

NCEH has provided dried-blood spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and

homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria screening tests to Switzerland's two neonatal screening laboratories, as well as to the Kinderspital in Zurich, which develops and distributes congenital hyperthyroidism and congenital adrenal hyperplasia blood-spot specimens for the European newborn screening quality-assurance program. Data analyses were performed and reports were developed for these laboratories.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Covance CLS, Geneva, Switzerland.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory insures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Complex/Humanitarian Emergencies-UNHCR

NCEH/EEHS/IERH collaborated with representatives of the United Nations High Commissioner for Refugees (UNHCR) and other organizations throughout the year on issues relating to complex/humanitarian emergencies. These collaborations included 1) meeting with UNHCR and the International Federation of the Red Cross (IFRC) to identify data sources and contact information for the IERHB/JHU-implemented Health Indicators for the Overall Health of a Population in Refugee Camps during the Post-Emergency Phase project; 2) working with UNHCR, NGOs, and other international agencies to finalize a list of epidemiological

indicators for reproductive health among refugees; and 3) attending a series of technical meetings to discuss epidemiological surveillance among refugees with representatives of UNHCR, WHO, and the International Office of Migration (IOM).

The indicators generated from these collaborations will be leveraged into the efforts of key international agencies dealing with humanitarian emergencies and refugee health.

Complex/Humanitarian Emergencies-WHO

An NCEH/EEHS/IERHB staff member is detailed to WHO headquarters in Geneva as a resident advisor to advise WHO on issues relating to the health and nutritional status of refugees and war-affected civilian populations.

NCEH representation at WHO headquarters leverages its ability to help guide policies relating to global emergency issues.

United Kingdom

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for congenital hypothyroidism and phenylketonuria screening tests to the United Kingdom's six neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.

NCEH also conducted performance evaluations for HIV antibody testing on dried-blood- spots in Glasgow, London, and Colindale. Quality-control materials have been validated and distributed to assist in determining seroprevalence among child-bearing women.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Cholesterol Reference Methods

In 1989, the US National Cholesterol Education Program (NCEP) began an unprecedented campaign to educate the medical community and the general public about the risk factors for coronary artery disease (CAD). To identify individuals at risk for CAD, NCEP recommended classifying patients using specific medical decision points for total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG). Properly classifying a patient's risk on the basis of these medical

decision points requires reliable and standardized measurements; therefore, the NCEP also made accuracy and precision recommendations for clinical laboratories.

A practical approach to standardizing lipid and lipoprotein measurements is to ensure that diagnostic products are properly calibrated by the manufacturers and traceable to the accuracy base. NCEP hasrecommended that the reference methods run at CDC serve as the accuracy base for lipid and lipoprotein measurements In 1990, CDC established the Cholesterol Reference Method Laboratory Network (CRMLN) to provide reference services to manufacturers and clinical laboratories. CRMLN laboratories use the CDC reference methods or designated comparison methods that are closely linked to the CDC reference methods. These laboratories are evaluated monthly by CDC to ensure that they meet the strict criteria necessary for interaction with manufacturers and the clinical laboratory community.

Many countries outside the United States have adopted the NCEP recommendations and have sought CDC's assistance in meeting them. The Institute of Biochemistry, Royal Infirmary, Glasgow, United Kingdom serves as the reference center for lipid disorders in Scotland and as a service laboratory for the Infirmary and surrounding physicians. This laboratory runs the reference method for cholesterol, the designated comparison method for HDL-C, and a CRMLN-standardized TG enzymatic method. Network activities include promotion of standardization efforts, providing sera with assigned values for calibration, and/or serving as the accuracy base in several national QA and standardization schemes. These schemes include the UK-wide National Initiative for Cholesterol Accuracy, Measurement, and Standardization (NICAMS); WEQAS (a Welsh external quality-control scheme); NOKLUS (a Norwegian QA scheme); and a pilot QA scheme in Greece. These programs have active involvement with National Health Service clinical chemistry laboratories, private contract laboratories, and research laboratories involved in large-scale epidemiological studies. This laboratory also serves as the accuracy base for several major epidemiological studies: FASTCARD (a large family study in Scotland), and the West of Scotland Coronary Prevention Study (WOSCOPS) follow-up study, and the newly launched PROSPER study (Prospective Study of Pravastatin in the Elderly at Risk). In addition, one clinical laboratory was certified for TC through the CRMLN clinical laboratory program. The Institute of Biochemistry has also worked with one manufacturer to evaluate their IDMS method for TC.

The Institute of Biochemistry's assistance in standardizing laboratories participating in epidemiological studies in cardiovascular disease and its treatment ensures that these studies can be compared to the knowledge base from which the NCEP medical decision points were made.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-

density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health (NIH). The goal of LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Royal Infirmary, Glasgow, and the Glasgow Gartnavel General Hospital, Glasgow, Scotland, United Kingdom.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Gulf War Syndrome

An EHHE/HSB staff member attended a working meeting of United Kingdom and United States investigators to share information about research on Gulf War illnesses, as well as to attend a meeting on Gulf War health-research programs. The staff member also presented information on NCEH's Gulf War research activities. Attendance at these meetings ensured that the research that the CDC is conducting on illnesses among Gulf War veterans was represented at these international information sharing meetings.

Gulf War Syndrome is a problem that has affected numerous U.S. military personnel, but much remains unknown about this problem. These meetings enabled NCEH researchers to share the work that is being undertaken in the United States with other researchers, as well as to learn about new research findings from other countries.

Laboratory Standardization: Lead

NBB provided laboratorians in the United Kingdom with four sets of whole blood materials with certified target values for lead to improve analytical accuracy and precision.

This collaboration enabled United Kingdom laboratorians to ensure the quality of their own blood lead testing within the context of clinical care and public health programming in the country.

Micronutrient Malnutrition

In a role initiated in 1989, LS/NBB staff continued consultative work for the laboratory component of the U.K. National Diet and Nutrition Survey, evaluating survey data from the Pre-School Age Children's Survey and assisting planning for the Adults' Survey (to begin in late 1999). Evaluation of planned homocysteine specimen collection protocols for this survey were completed with assistance from several U.S. labs and manufacturers. Improved measurement of vitamin D for the U.K. survey and for NHANES was supported through the International External Quality-assurance Scheme for Vitamin D (DEQAS) in collaboration with Hammersmith Hospital, London. NBB staff also attended a meeting of the International Advisory Committee in Kent, and continues to assist in the promulgation of this program's efforts.

NCEH consultation contributed to the United Kingdom's capacity to undertake their national survey, and the laboratory methods

developed for vitamin D are relevant to work being done in both the United Kingdom and United States.

Yugoslavia

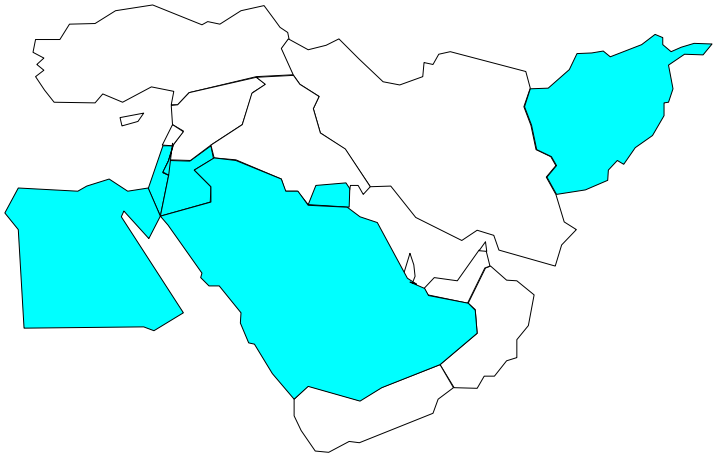
Complex/Humanitarian Emergencies

In August 1998, an EEHS/IERHB public health advisor and a NIOSH medical epidemiologist assisted USAID in assessing the current and near-term needs of people involved in the complex health emergency in Kosovo and in providing USAID's Office of Foreign Disaster Assistance (OFDA) and other parts of the United States Government with practical and effective program recommendations. The assessment revealed that the situation had the potential to quickly become a major humanitarian crisis unless systems were immediately put in place to respond to major health and nutrition needs.

These findings and recommendations were critical in convincing U.S. government and international humanitarian agencies of the need to focus additional assistance on these priority areas within the health sector in Kosovo.

Middle East

NCEH FY 1998 Collaborations in the Middle East



CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Afghanistan

Complex/Humanitarian Emergencies

In November 1997, NCEH assisted USAID's Office of Foreign Disaster Assistance (OFDA) in conducting an assessment of the health and nutrition status of the internally displaced population and of the various health programs in Afghanistan. The lack of current health information was found to make prioritization of health problems very difficult and greatly impeded the rational development of health programs targeted toward reducing the major causes of severe mortality and morbidity. This dearth of information was a major limitation in monitoring the effectiveness and impact of existing and future health programs.

The objective of the assessment was to describe the current health situation in order to assist OFDA in setting priorities for funding potential relief programs in the near future. As a result, this activity leveraged CDC/ NCEH's technical consultation into resource allocation and technical programming of a key partner agency.

Egypt

Lead Poisoning: Laboratory

The Lead in Egypt Project (a collaboration including EHHE and LS) began in 1996 as an evaluation project to determine the extent of lead poisoning in Egypt, which did not begin to use unleaded gasoline until 1997. LS/NBB laboratorians established blood lead analysis capabilities in the Central Laboratory, Cairo, and began extensive work to expand blood lead analysis throughout Egyptian laboratories. A 1997 survey of villagers near the Aswan High Dam area revealed the highest blood lead levels ever measured by NBB. The high lead levels were caused by contamination of flour by lead that had melted onto local granary millstones.

In FY 1998, NBB provided consultations and blood lead specimen collection, analysis, and quality-control supplies for the Middle East Regional Commission for blood lead measurements in Egypt, Israel, Palestine, and Jordan. A planned training course in blood lead analysis and quality-assurance, as well as a follow-up evaluation of progress made by the Central Health Laboratory's activities, was rescheduled for spring of 1999 due to the unstable political situation in the Middle East. NBB Blood Lead Laboratory Reference program (BLLRS) also certified reference materials for blood lead that were sent to several labs in Egypt to improve blood lead analysis accuracy and precision.

The laboratory consultations and quality-assurance program further enable Egyptian collaborators to carry out accurate analyses of blood and environmental levels of lead in their country.

Lead Poisoning: Outbreak

EHHE/SPB worked with the Egyptian Field Epidemiology Training Program and the Central Public Health Laboratory of the Egyptian Ministry of Health and Population to develop epidemiologic and laboratory capacity to address lead poisoning as a public health problem. Under this activity, an investigation of an outbreak of lead poisoning was conducted and the source identified as a flour mill. A survey of children ages 2 - 6 years living in selected communities in Cairo is under way. The capacity of the laboratory to perform analysis of lead in blood has been established.

Current activities focus on publishing the results of the investigation and assisting with

the implementation of the survey. In addition, NCEH and Ministry of Health staff are discussing further areas of collaboration in environmental health.

The direct participation of NCEH staff in this investigation helped lead to the identification of the cause of lead poisoning and to its ultimate prevention. In addition, this activity further enhances the public health capacity of Egyptian collaborators.

Israel (and Gaza)

Bioterrorism

In connection with an effort related to three Middle Eastern countries and as part of a team of experts requested by the U.S. Department of State, an EEHS/EPRB staff member traveled to Jerusalem and Tel Aviv, Israel. The team visited U.S. Embassies in three Middle Eastern countries 1) to present a current threat assessment of chemical and biological warfare in the area; 2) to present an overview to key embassy staff of chemical-warfare agents and their effects on the human body; 3) to present an overview of biological weapons, prevention and protection measures and management of consequences; and 4) to present an overview of the prevention and consequence management of chemical warfare. These overviews were presented to embassy personnel in charge of training other embassy workers.

In addition, the team analyzed embassy staff housing and the feasibility of establishing 'safe rooms' within the homes of embassy staff that could be used by personnel and their families in the event of a biological or chemical warfare event. NCEH also participated in training embassy personnel on setting up these safe rooms. Finally, the team assessed the embassy's reach back system, which enables embassy staff to contact staff at the Department of State in the United States and other countries to receive advice and support (e.g. diagnostic testing) when a possible bioterrorist attack has occurred. The team provided materials to embassy staff for use in training other staff members.

The NCEH staff member also briefed the Chief Medical Officer of the Department of State (DOS), highlighting the need to establish better reach back capabilities among the embassies and the DOS, and including the need 1) to establish rapid diagnostic capabilities for these chemical or biological agents, 2) to implement surveillance systems to identify covert attacks, and 3) to establish U.S.-based links that can be used by the embassy medical staff for consultations during emergencies, e.g., poison control centers.

This activity was designed to protect Americans on duty at Middle Eastern embassies from chemical or biological attacks in the future.

In addition, the recommendations made by the team may be used by the DOS in formulating or revising policy at other embassies.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDL-C) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health. The goal of LSP is to improve the laboratory

measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the Institute of Lipid and Atherosclerosis Research, Tel Hashomer and Hadassah Hospital Ein Kerem, Jerusalem, Israel.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from the study is comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Laboratory Standardization: Lead

LS/NBB provided laboratorians in Israel with four sets of whole blood materials with certified target values for lead to improve analytical accuracy and precision. In addition, NBB provided consultations and blood lead specimen collection, analysis, and quality-control supplies for the Middle East Regional Commission for blood lead measurements in Egypt, Israel, Palestine, and Jordan.

The laboratory reference materials enabled Israeli collaborators to ensure the quality of their laboratory testing as they assess their own public health problems associated with exposures to environmental lead.

Micronutrient Malnutrition

LS/NBB collaborated in a study among the refugee population in Gaza that was very similar to the Tanzania Refugee Study described in another section, and took advantage of the information gained about the practical utility of the transferrin receptor assay (TfR) for detection of iron deficiency anemia. NBB staff assisted NCCDPHP in preparing field-specimen collection materials, and provided analyses for blood lead, vitamin A, and ferritin. LS/CBB staff will also provide TfR and thalassemia testing (from blood spots).

This study will expand our knowledge about the causes of iron deficiency anemia in a population for whom the possibility of multiple etiologies exists.

Jordan

Bioterrorism

In connection with an effort related to three Middle Eastern countries and as part of a team of experts requested by the U.S. Department of State, an EEHS/EPRB staff member traveled to Amman, Jordan. The team visited U.S. Embassies in three Middle Eastern countries 1) to present a current threat assessment of chemical and biological warfare in the area; 2) to present an overview to key embassy staff of chemical warfare agents and their effects on the human body; 3) to present an overview of biological weapons, prevention and protection measures and management of consequences; and 4) to present an overview of the prevention and consequence management of chemical warfare. These overviews were presented to embassy personnel in charge of training other embassy workers.

In addition, the team analyzed embassy staff housing and the feasibility of establishing ‘safe rooms’ within the homes of embassy personnel that could be used by personnel and their families in the event of a biological or chemical warfare event. NCEH also participated in training the embassy personnel

on setting up these safe rooms. Finally, the team assessed the embassy reach back system, which enables embassy staff to contact staff at the Department of State staff in the United States and other countries to receive advice and support (e.g. diagnostic testing) when a possible bioterrorist attack has occurred. The team provided printed materials to embassy staff upon leaving for use in training other staff members.The NCEH staff member also briefed the Chief Medical Officer of DOS, highlighting the need to establish better reach back capabilities among the embassies and the DOS, and including the need 1) to establish rapid diagnostic capabilities for these chemical or biological agents, 2) to implement surveillance systems to identify covert attacks, and 3) to establish U.S.-based links that can be used by the embassy medical staff for consultations during emergencies (e.g., links with poison control centers).

This activity was designed to protect Americans on duty at Middle Eastern embassies from chemical or biological attacks in the future. In addition, the recommendations made by the team may be used by DOS in formulating or revising policy at other embassies.

Kuwait

Bioterrorism

In connection with an effort related to three Middle Eastern countries and as part of a team of experts requested by the U.S. Department of State, an EEHS/EPRB staff member traveled to Kuwait City, Kuwait. The team visited U.S. Embassies in three Middle Eastern countries 1) to present a current threat assessment of chemical and biological warfare in the area; 2) to present an overview to key embassy staff of chemical warfare agents and their effects on the human body; 3) to present an overview of biological weapons, prevention and protection measures and management of consequences; and 4) to present an overview of the prevention and consequence management of chemical warfare. These overviews were presented to embassy personnel in charge of training other embassy workers.

In addition, the team analyzed embassy staff housing and the feasibility of establishing ‘safe rooms’ within the homes of embassy personnel that could be used by personnel and their families in the event of a biological or chemical warfare event. NCEH also participated in training the embassy personnel on setting up these safe rooms. Finally, the team assessed the embassy reach back system, which enables embassy staff to contact staff at the Department of State staff in the United States and other countries to receive advice and support (e.g. diagnostic testing) when a possible bioterrorist attack has occurred. The team provided printed materials to embassy staff upon leaving for use in training other staff members.

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This activity was designed to protect Americans on duty at Middle Eastern embassies from chemical or biological attacks in the future.

In addition, the recommendations made by the team may be used by DOS in formulating or revising policy at other embassies.

Saudi Arabia

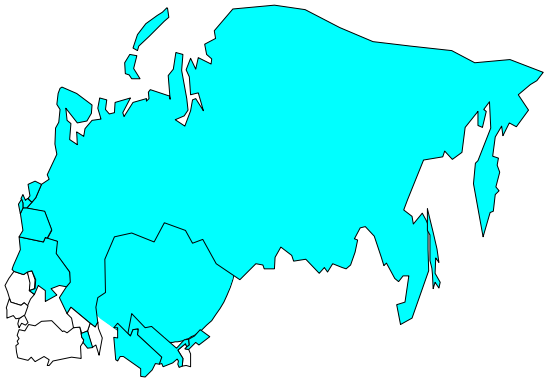
Gulf War Syndrome

An EHHE/OD staff member was part of an interagency team assembled by the Office of the Special Assistant for Gulf War Illnesses that visited Saudi Arabia to discuss the feasibility of conducting a study of health outcomes among Saudi Arabia National Guard (SANG) members and their dependents. The interagency team met with staff from the King Fahd National Guard Hospital (KFNGH) to fully explore the medical databases available for SANG members and their dependents. The purpose of the visit was to obtain information on the type of health data collected, when and under what circumstances data are collected, how health data are stored and accessed, how data quality and validity are ensured, and what procedures are used to protect privacy. Before leaving Saudi Arabia, the interagency team prepared a status report that addressed the feasibility of using the SANG health database to assess possible health outcomes of the Gulf War.

This study will contribute to our understanding of Gulf War Syndrome in the United States. Gulf War Syndrome is a problem that has affected numerous United States military personnel, and much remains unknown about this problem. These meetings enabled NCEH researchers to share the work that is being undertaken in the United States with other researchers, as well as to learn about new findings from other countries.

New Independent States

NCEH FY 1998 Collaborations in the New Independent States



CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Belarus

Micronutrient Malnutrition

LS/NBB participated in a project which is part of the former Gore-Chernomyrdin Commission's (GCC) Micronutrient Malnutrition Priority Area. GCC is a bi-national cooperative project with the Russian Federation. The GCC micronutrient malnutrition efforts have involved more than 60 external organizations, including government agencies, a UN agency, NGOs, academia, and the private sector. The overall purpose of the project is to work towards eliminating iodine and other micronutrient deficiencies in Russia by developing and implementing public health programs to fortify foods with micronutrients and to monitor nutritional status in the population. This epidemiologist devotes approximately one half of all work time to assisting in coordinating NCEH and external partner efforts related to this project as well as to providing technical assistance and participation in specific GCC activities related to iodine deficiency. He participated in a workshop "Iodized Salt: Problems and Solutions" in Moscow in November 1997. This workshop involved participants from Ukraine, Russia, and Belarus who work in the Ministry of Health or salt industry. He further helped in the facilitation and production of this workshop.

NCEH's participation in GCC activities leverages CDC expertise in the area of iodine deficiency by bringing together global partners and by helping to direct policy concerning this issue.

Estonia

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for thyroid stimulating hormone, congenital hypothyroidism, and phenylketonuria screening tests to Estonia's neonatal screening laboratory. Data analyses were performed and reports were developed for this laboratory.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Georgia

Micronutrient Malnutrition

At the request of the Minister of Health of the Republic of Georgia, an EHHE/RSB epidemiologist has participated in several consultations in previous years as part of a team to assess iodine deficiency disorders (IDD) and to set up a national program to eliminate IDD. This work was done with representatives of multinational and NGOs. During FY 1998, he participated in follow-up activities by phone from CDC in Atlanta. For example, he introduced the Director of the newly created national IDD program to the Director of the Kiwanis International. As a result, Kiwanis provided a $105,000 grant to the Republic of Georgia. The epidemiologist also provided technical advice about IDD assessments to CDC EIS officers in Georgia.

This collaboration leverages NCEH expertise by bringing different organizations together to collaborate on projects related to iodine deficiency.

Kazakstan

Environmental Health

To assist the Ministry of Health of Kazakstan in making infant feeding recommendations, NCEH scientists, in collaboration with California Department of Health and researchers from Kazakstan, measured dioxin and pesticide levels in the breast milk from women in the general Kazakstan population. The data have been analyzed and several papers published. A number of women had elevated levels of TCDD (dioxin) in their breast milk.

This study contributes to our knowledge base concerning prenatal and postnatal (through breast milk) TCDD exposure and potential adverse developmental effects. Increased knowledge about international environmental pollution should ultimately result in reducing global pollution, which, in turn, will benefit the health of populations in the United States and worldwide.

Environmental Health: Drinking Water

EHHE/HSB, at the request of USAID/ Central Asia, has undertaken a series of metropolitan water-distribution-system assessments in major cities in all five countries within Central Asia that were formerly in the Soviet Union. The purposes were 1) to evaluate the integrity of water-distribution systems. This is accomplished by quantifying the frequency of water outages at the household level, the level of fecal contamination at the household tap level, the effluent level at the water treatment plant, the amount of water wastage, and the presence of free chlorine residual at the tap level; 2) to disseminate a simple and quick method for evaluating the risk for cross-contamination in a distribution system; and 3) to convince local authorities of the value in continuing this type of evaluation. The evaluation revealed a high risk of contamination-induced illness in two of the cities and comparatively moderate levels of risk in three others. As a result, local staff were trained to conduct similar types of surveys, and foreign assistance efforts were focused on proper water-distribution system management.

This activity had several types of impact. The participation of the NCEH investigators led to improved knowledge of the integrity of the water distribution systems. As a result of the evaluations, local staff were trained to conduct similar types of surveys and to focus on proper water distribution system management. This information can be used by local authorities to better allocate

resources to improve those areas noted. Finally, this activity increased capacity and training by disseminating a simple and quick method of evaluation that can be used by local authorities in the future.

Kyrgystan

Environmental Health: Drinking Water

EHHE/HSB, at the request of USAID/ Central Asia, has undertaken a series of metropolitan water-distribution-system assessments in major cities in all five countries within Central Asia that were formerly in the Soviet Union. The purposes were1) to evaluate the integrity of water-distribution systems. This is accomplished by quantifying the frequency of water outages at the household level, the level of fecal contamination at the household tap level, the effluent level at the water treatment plant, the amount of water wastage, and the presence of free chlorine residual at the tap level; 2) to disseminate a simple and quick method for evaluating the risk of cross-contamination in a distribution system; and 3) to convince local authorities of the value in continuing this type of evaluation. The evaluation revealed a high risk of contamination-induced illness in two of the cities, and comparatively moderate levels of risk in three others. As a result, local staff were trained to conduct similar types of surveys, and foreign assistance efforts were focused on proper water distribution system management.

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Latvia

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening-test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for congenital hypothyroidism screening tests to Latvia’s neonatal screening laboratory. Data analyses were performed and reports were developed for this laboratory.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Lithuania

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for congenital hypothyroidism screening tests to Lithuania's neonatal screening laboratory. Data analyses were performed and reports were developed for this laboratory.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of this laboratory ensures that the data produced from future studies are comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Russia

Bioterrorism

The U.S. Cooperative Threat Reduction Nunn-Lugar Program allocated funds to design and construct a Russian chemical weapons destruction facility in Schuch'ye, Russia, to assist Russia in dismantling its 40,000 metric-ton chemical weapons stockpile. Green Cross Russia has been holding public hearings on this issue and subcontracted with a local physician to conduct a health study around the proposed site. The Department of Defense (DOD) asked CDC to evaluate the study and give comments on conducting the next phase of the study.

The health study consisted of a health survey of the existing medical conditions in the Schuch'ye area. The study did not identify any trends to indicate that morbidity was any higher than in comparable control populations. In addition, the health conditions that were evaluated in the study were not typical symptoms associated with exposure to organophosphate chemicals. We indicated that there is a public health benefit in setting up a public health surveillance system and this could be used as a public outreach effort to address the concerns of the local people. Additional funds were allocated for this project. All future efforts beyond this funding would be the responsibility of the Russian public health authorities.

This activity supports U.S. foreign policy and should ultimately reduce the threat of chemical weapons use from this source.

Birth Defects: Neonatal Screening

NCEH has provided dried-blood-spot quality-assurance materials and performance-evaluation reports for congenital hypothyroidism, phenylketonuria, galactosemia, congenital adrenal hyperplasia, maple syrup urine disease, and homocystinuria to newborn screening laboratories and manufacturers of screening test products around the world. For this

program, dried-blood-spot quality-control materials have been developed and analytically validated, computer programs for data analyses have been developed, dried blood spot materials have been distributed, reported data have been analyzed, and reports have been developed for these laboratories.

As part of an international quality-assurance program, LS/CBB staff provided dried-blood-spot quality-control and performance-evaluation materials for congenital hypothyroidism screening tests to Russia's two neonatal screening laboratories. Data analyses were performed and reports were developed for these laboratories.
A Russian scientist from the International Council for Control of Iodine Deficiency Disorders visited NCEH and consulted with CBB staff on measurement details for hypothyroidism detection. NCEH Laboratory scientists traveled to Moscow to present a symposium on scientific and newborn screening to the Russian Academy of Medical Sciences and to present an overview of the NCEH Newborn Screening Quality-assurance Program (NSQAP) to members of ISTC headquarters in Moscow. In addition, NCEH scientists held discussions with leaders of the Russian Academy of Medical Sciences on both the scientific and logistical aspects of dried-blood spots and the benefits of using the accuracy base and quality-controls materials of dried-bloodspot materials in developing luminescent immunoassays for newborn screening in Russia.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from the study is comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984, the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high-density lipoprotein cholesterol (HDLC) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of the National Institutes of Health (NIH). The goal of LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with the accuracy and precision needed for detecting, treating, and preventing cardiovascular disease.

In this collaboration, NCEH provided standardization support services to lipid research laboratories at the National Research Center for Preventive Medicine, Moscow, and Institute of Experimental Medicine, St. Petersberg, Russia.

Testing and standardizing laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization of these laboratories ensures that the data produced from future studies is comparable to data obtained from other epidemiologic studies conducted in the United States and globally.

Laboratory Standardization: Lead

As part of the extended work of the former Gore/Chernomyrdin Commission, CDC has worked to improve collaboration between U.S. and Russian scientists for blood lead analysis. This project builds on site studies done in Saratov and Ekaterinburg in 1997 in an effort to expand infrastructure from Moscow. LS/NBB staff conducted a blood

lead laboratory workshop in Moscow for laboratorians and public health officials. They evaluated two potential laboratories for a blood lead laboratory infrastructure building. NBB provided laboratorians with whole blood lead materials with certified target values for lead through its Blood Lead Laboratory Reference System (BLLRS) program.

Russian scientists were trained in new methodologies and technologies and NCEH evaluated the established laboratory infrastructure. This involvement will increase the capacity of Russian researchers.

Lead Poisoning

As part of the extended work of the former Gore-Chernomyrdin Commission, CDC has worked to improve collaboration between U.S. and Russian scientists for blood lead analysis.

EHHE/LPPB and EHHE/HSB collaborated on a series of studies 1) to measure the blood lead and hemoglobin levels in children of kindergarten age and to gather demographic, nutritional, and environmental exposure data about these children via parent-answered questionnaires; 2) to measure environmental lead levels (in water, soil, paint, and dust) in kindergartens and in the private homes of a sample of the children; 3) to field-test a newly approved portable blood lead testing instrument, the LeadCare Blood Lead Testing System®; and 4) to train local health professionals in the use of the LeadCare® instrument, the HemoCue® Blood Hemoglobin Photometer, and the PaceScan® System, an environmental lead laboratory system. Contact was made with several people from key health organizations within the country, such as USAID, the Federal Ministry of Health (MOH), as well as with the mayor. Five researchers from NCEH participated in the study in Ekaterinburg/ Krasnouralsk. The field study included measuring blood lead and hemoglobin levels and questionnaire data. Concurrently, researchers collected environmental samples from the kindergarten. At the field laboratory, one CDC researcher trained and supervised two Russian environmental specialists in the use of the PaceScan System to analyze environmental samples. NCEH staff also collected environmental samples at the homes of children with the highest blood lead measurements and distributed information on lead poisoning and prevention measures.

All of the study objectives were met. Analysis of the blood lead, hemoglobin, and questionnaire data is ongoing, and the environmental sampling data will be sent to us when completed. The LeadCare® system worked well, and all blood samples were analyzed. However, the NCEH team discovered a problem with the cold sensitivity of the LeadCare analyzer, and often had to use body heat to warm the device while it was in transit. This problem could prove a liability in some field settings. Quality- assurance /control data were kept and are being reviewed by the laboratory. Retesting on a group of preserved blood samples was performed for validation of field results. In addition, the NCEH team successfully trained a number of Russian health professionals to use the various technologies, and left one HemoCue® instrument and one LeadCare® instrument in Ekaterinburg, and one HemoCue® instrument in Krasnouralsk for continued use.

Further activities will include assisting the Federal Ministry of Health in establishing reference laboratories for blood lead measurement and offering guidance and support of future lead studies in Russia, possibly focusing on occupational exposures.

This study had two main types of impact. The first was the direct policy impact based on study results. Secondly, collaborators in Russia were trained in both study methodology and new technology. Additionally, two machines were donated to the Russians, that will enable them to continue to undertake blood lead analyses.

Micronutrient Malnutrition-Iodine

The overall purpose of the project is to work toward eliminating iodine deficiency in Russia through developing and implementing public health programs to fortify foods with micronutrients and to monitor nutritional status in the population. This activity is part of the former Gore-Chernomyrdin Commission's Micronutrient Malnutrition Priority Area which is a bi-national cooperative project with the Russian Federation - involving more than 60 external organizations (government, a UN agency, NGOs, academia, and the private sector). A LS/NBB staff member devotes approximately one half of all work time assisting in the coordination of NCEH and external partner efforts related to this, providing technical assistance and participation in specific Gore-Chernomydrin Commission (GCC) activities related to iodine deficiency. This included participation in a workshop "Quality-assurance of Iodized Salt, and Biological Monitoring of Iodine Deficiency Disorders (IDD) in Russia" in Moscow in July 1998. An NBB representative helped in the facilitation and production of this workshop.

This work will ultimately directly impact the health of the Russian population, by reducing iodine deficiency disorders. NCEH efforts were greatly leveraged by working with an extensive network of key partners.

Micronutrient Malnutrition-Iron

Iron deficiency is one of the areas targeted for intervention by the US-Russian Joint Commission on Economic and Technological Cooperation (formerly the GCC). As a result, Russian and U.S. public health officials, together with Russian private-sector and food-industry representatives, have developed plans for a pilot project to assess the impact of food fortification on the prevalence of anemia among the population of Ivanovo, an area of Russia which has reported significant increases in iron deficiency anemia due to economic reversals in recent years. NCEH and NCCDPHP staff traveled to Moscow and Ivanovo in summer 1998 to discuss the fortification project and a second project of special food development for pregnant women, to be done in collaboration with the Heinz company, in a large maternity hospital in Lubertsy, a suburb of Moscow.

Four laboratories were visited and evaluated in various locations in the Moscow and Ivanovo areas Consultation was provided to the Institute of Nutrition in Moscow for specimen collection, processing, shipment, storage, and analysis in preparating for a proposed nutrition survey. The team worked extensively with the U.S. Embassy in Moscow, as well as with UNICEF and a number of NGOs to solicit funding for these projects. A background survey for iron deficiency was conducted in fall 1998 to provide corrected data on actual prevalence of iron deficiency and anemia before commencing the flour fortification project, which has been approved by local and national Russian government officials.

The ultimate impact of this study should include a direct impact on the health of Russian children and women (who are most affected by iron deficiency) and a domestic

impact, based on using creative new approaches to food fortification.

Pesticides

During a June 1997 workshop on pesticide regulation and human health in Russia and the United States, CDC and the EPA were told that most (if not all) collective and communal farms in Russia have depots of obsolete stored pesticides. Obsolete pesticides usually include DDT and other organochlorine products that have been banned throughout the world for human health or environmental health reasons. If left unattended, these pesticides may volatilize and will be atmospherically distributed throughout the world. A team from EHHE/HSB visited Russia to set up the summer pesticide field study in Krasnodarski Krai and to evaluate laboratories in Moscow to see whether or not they could analyze pesticide samples for the study this summer.

If the study were carried out and relevant pesticides destroyed, the United States and other countries worldwide would benefit from the reduction of the volatized chemicals in the atmosphere. In addition, this activity would directly benefit the health status on Russians affected by pesticides in the area in which this study will take place. Finally, laboratory capability would be increased through training and capacity building.

Tajikistan

Environmental Health: Drinking Water

EHHE/HSB, at the request of USAID/ Central Asia, has undertaken a series of metropolitan water-distribution-system assessments in major cities in all five countries within Central Asia that were formerly in the Soviet Union. The purposes were 1) to evaluate the integrity of water-distribution systems. This is accomplished by quantifying the frequency of water outages at the household level, the level of fecal contamination at the household tap level, the effluent level at the water treatment plant, the amount of water wastage, and the presence of free chlorine residual at the tap level; 2) to disseminate a simple and quick method for evaluating the risk of cross-contamination in a distribution system; and 3) to convince local authorities of the value in continuing this type of evaluation. The evaluation revealed a high risk of contamination induced illness in two of the cities, and comparatively moderate levels of risk in three others. As a result, local staff were trained to conduct similar types of surveys, and foreign assistance efforts were focused on proper water distribution system management.

This activity had several types of impact. The participation of the NCEH investigators led to improved knowledge of the integrity of the water distribution systems. As a result of the evaluations, local staff were trained to conduct similar types of surveys, and the focusing on proper water distribution system management. This information can be used by local authorities to better allocate resources to improve those areas noted. Finally, this activity increased capacity and training by disseminating a simple and quick method of evaluation that can be used by local authorities in the future.

Turkmenistan

Environmental Health: Drinking Water

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Ukraine

Micronutrient Malnutrition

A LS/NBB epidemiologist participated in a project which is part of the former Gore-Chernomyrdin Commission's (GCC) Micronutrient Malnutrition Priority Area. GCC is a bi-national cooperative project with the Russian Federation. The GCC micronutrient malnutrition efforts have involved more than 60 external organizations, including government, a UN agency, NGOs, academia, and the private sector. The overall purpose of the project is to work towards eliminating iodine deficiency in Russia through developing and implementong public health programs to fortify foods with micronutrients and to monitor nutritional status in the population. A NBB staff member devotes approximately one half of all work time assisting in the coordination of NCEH and external partner efforts related to this project, as well as providing technical assistance and participation in specific GCC activities related to iodine deficiency. He participated in a workshop "Iodized Salt: Problems and Solutions" in Moscow in November 1997. This workshop involved participants from Ukraine, Russia, and Belarus who work in the Ministry of Health or salt industry. He further helped in the facilitation and production of this workshop.

NCEH participation in GCC activities leverages CDC expertise in the area of iodine deficiency by bringing together global partners and by helping to direct policy concerningthis issue.

Uzbekistan

Environmental Health: Drinking Water

EHHE/HSB, at the request of the U.S. Agency for International Development (USAID)/ Central Asia, has undertaken a series of metropolitan water-distribution-system assessments in major cities in all five countries within Central Asia that were formerly in the Soviet Union. The purposes were to: 1) evaluate the integrity of water-distribution systems. This is accomplished by

quantifying the frequency of water outages at the household level, the level of fecal contamination at the household tap level, the effluent level at the water treatment plant, the amount of water wastage, and the presence of free chlorine residual at the tap level; 2)disseminate a simple and quick method for evaluating the risk of cross-contamination in a distribution system; and 3)convince local authorities of the value in continuing this type of evaluation. The evaluation revealed a high risk of contamination induced illness in two of the cities, and comparatively moderate levels of risk in three others. As a result, local staff were trained to conduct similar types of surveys, and foreign assistance efforts were focused on proper water distribution system management.

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Global

CDC
CENTERS FOR DISEASE CONTROL
AND PREVENTION

Birth Defects

The International Center for Birth Defects (ICBD) in Italy functions as the coordinating and scientific headquarters for the International Clearinghouse for Birth Defects Monitoring Systems (ICBDMS). The main activities of ICBD center on international birth defect surveillance and etiologic studies geared towards birth defect prevention. It conducts regular (quarterly and annual) monitoring of birth defects, including multiple congenital anomalies, for early detection of new teratogens (ongoing); study on complex limb deficiencies (completed); international study on the impact of folic acid policies on neural tube defect occurrence (ongoing); international study on genetic determinants of neural tube defects (ongoing); and improving surveillance and communication through internet-based information systems (ongoing). ICBD is a unique resource for international birth defect monitoring and etiologic studies.

Teratogens know no country boundaries. Early detection of teratogens in other countries may limit their impact in the U.S. The knowledge on prevention strategies and etiology gained from this international collaboration may have major implications for birth defect prevention in the U.S. For example, at the annual meeting of Clearinghouse participants in November 1997, BDPG staff learned that the Netherlands has rapidly achieved high coverage with folic acid for the prevention of neural tube defects.

CDC and the U.S. will benefit from learning more about the approaches and success of this program. NCEH's direct involvement with an international coordinating agency for birth defect surveillance helps leverage the international surveillance of birth defects and investigations into their etiologies.

Cholesterol and Related Lipids: Laboratory Standardization

In 1984 the current CDC-National Heart, Lung, and Blood Institute (NHLBI) Lipid Standardization Program (LSP) was implemented to offer combined total cholesterol (TC), triglyceride (TG), and high density lipoprotein cholesterol (HDLC) standardization services. Standardization assistance is offered to any laboratory involved in clinical trials and investigations supported by NHLBI and other institutes of National Institutes of Health (NIH). The goal of the LSP is to improve the laboratory measurement of cholesterol and related lipids so that they are measured with accuracy and precision needed for the detection, treatment, and prevention of cardiovascular disease. As part of efforts of IFCC, worked to establish prerequisites for interpretation of blood lipid measurements; specifically to develop and establish the suitability of NCEP guidelines for lipid and lipoprotein measurements. A senior NCEH/LS medical officer contributed to IFCC efforts on reference methods for apolipoproteins. CDC serves as a repository for WHO/IFCC international reference reagents for apolipoproteins A1 and B. We also serve as consultants for international laboratories on apolipoprotein measurement problems.

Cholesterol and Related Lipids: Laboratory Standardization

A senior level LS medical officer participated in a Washington, DC meeting of WHO/PAHO Collaborating Center for Reference and Research in Blood Lipids to develop plan for collaborating laboratories to work with PAHO to meet WHO objectives. Attendees included representatives from US, Canada, South- and Central America.

The testing and standardization of laboratory methods will enable laboratories around the world to provide accurate diagnostic results for decision making. The standardization laboratories insures that the data produced from studies are comparable to other epidemiological studies conducted in the U.S. and globally.

Disabilities and Health

The World Health Organization (WHO) is in the process of revising the International Classification of Impairments, Activities and Participation: A Manual of Dimensions of Disablement and Functioning (ICIDH2). CDC's Office of Disability and Health (ODH) (now CDDH/SPB) has been involved since the beginning of the revision process in 1993. As the process has continued, participation has increased, so that during Fiscal Year (FY) 1998, SPB staff attended two international meetings, and five staff members were involved in different aspects of the process. The culmination of this involvement was the completion of a cooperative agreement between WHO and CDC to examine empirically the role of environmental factors as an essential component of the disabling process for adults and children, carry out field testing protocols internationally, and assist in the production of a two-digit classification code for environmental factors within the ICIDH2 framework. Over the course of the year, beta testing was completed, addressing conceptual, definitional and classification issues. Cross-cultural challenges were of paramount importance. The emphasis on environmental factors in the framework was also emerging more clearly.

Disabilities and health, including the prevention of secondary conditions, is an important public health priority in the U.S. This collaboration will lead to updated international standardization of classification of impairments, disabilities and handicaps and ultimately their association with environmental factors, not only in the U.S., but ultimately worldwide. NCEH collaboration with WHO leverages CDC's resources and expertise to raise the visibility and attention to these issues in a broader global context.

Environmental Health: Biomonitoring-Pesticides

On a worldwide basis, NCEH laboratory scientists were prominently engaged in global activities involved in addressing various organic toxicants. Specifically, one or more NCEH laboratory scientists: (1) Was named a member of the International Advisory Committee for Environmental Analysis-98 in Ottawa, Canada; (2) Was appointed Chairman for Analytical Sessions for Dioxin-98 in Stockholm, Sweden; (3) Served as member of the International Meeting Board for Dioxin-98; (4) Gave several presentations at the International Dioxin- 98 meeting; (5) Was on the International Advisory Committee for Dioxin-98 in Stockholm, Sweden; (6) Presented at the International Congress on Endocrine Disruptors in Kyoto; (7) Participated in a meeting at PAHO describing a proposal to evaluate exposure to persistent organic pollutants (POPs) in the Americas; (8) Attended a methyl mercury workshop in Raleigh, NC and described the levels of PCBs, a potential confounder for neurological effects of methyl mercury, in the Seychelles and Faroe Islands studies; (9) Was appointed to the 1998 Advisory Board of the Journal of Analytical Chemistry; (10) Were appointed chairmen for technical sessions for Dioxin-99 in Venice, Italy; (11) Presented at the AOAC International Meeting in Montreal, Quebec, Canada; (12) Was appointed to the Advisory Board of the International Society of Environmental Medicine; (13) Was invited and accepted an

offer from WHO to write a chapter on Human Exposure to Endocrine Disruptors; (14) Was elected a Government Counselor to the International Society of Exposure Assessment; (15) Presented at the Biennial International Conference on Chemical Measurement and Monitoring of the Environment in Ottawa, Canada; and (16) Attended the International Conference on Pesticide Use in Developing Countries in San Jose, Costa Rica.

Collaboration and consultation with international scientists enhances NCEH scientists' capability to improve the technology applied in biomonitoring of environmental pollutants and increase the knowledge concerning the health effects of this environmental pollution ultimately decreasing global pollution which will result in an improvement in the health of U.S. citizenry. Thus, such global collaborations will ultimately leverage impact on a world wide basis as well as impacting these public health issues in the U.S.

Environmental Health: Radiation

An international program on Biosphere Modeling and Assessment methods (BIOMASS) is being conducted by the International Atomic Energy Agency, a branch of the United Nations. EHHE/RSB is a co-sponsor of this program. One of the purposes of BIOMASS is to test predictions made by environmental radiological assessment models appropriate for dose reconstruction purposes against data measured in the environment. The initial test scenario for one of the BIOMASS working groups uses data compiled as part of the CDC-sponsored Hanford Environmental Dose Reconstruction (HEDR) project. The next scenario is for radionuclides released to the Iput River in the former Soviet Union. CDC's private sector partner, SENES Oak Ridge, Inc., provides the chair of this dose reconstruction working group.

The purpose of CDC's participation in this project is to provide the Radiation Studies Branch with a written summary and review of the validity of the mathematical models and procedures used in the Hanford Environmental Dose Reconstruction Project and other related public health activities, including the Hanford Thyroid Disease Study.

This collaboration will have both domestic and overseas impact. Environmental health related to radiation exposure is a high priority in the U.S. This international collaboration both draws from and contributes to radiation-related studies performed in the United States, and ensuing public health recommendations. Comparisons of data from predictive models and actual exposures help to refine the predictive models.

Laboratory: Diabetes

An NCEH laboratory scientist participated in IFCC meeting of clinical chemistry working group on glycohemoglobin (HbA1C) held in Munich, Germany. The US, Korea, Japan, Australia, Germany and Sweden were represented at this meeting. International collaboration in this issue will impact both domestic and foreign diabetes prevention and control efforts.

Laboratory: Urinary Biomarkers

A LS/NBB staff member participated in a workshop held in London in June 1998, which was a follow-up meeting to the workshop held in Atlanta in 1995 and hosted by CDC. The purpose was to provide updates on 1) the use of biomarkers of environmental nephrotoxicity, with an

emphasis on their use in children, 2) the development of clinical models to validate biomarkers and study the early development of renal disease, 3) genetic risk factors for renal disease and new biomarkers, 4) mechanisms of nephrotoxicity, and 5) to provide recommendations for future research.

The proceedings of the workshop (approximately 30 papers) will be published. The publications will include recommendations for future research in the area. The workshop developed the following recommendations: 1) New biomarkers: a collaborative effort among investigators is needed to develop a protocol by which new markers can be tested in parallel with a standard panel of urinary biomarkers. 2) Consideration should be given to the addition of cystatin C as a marker of the glomerular filtration, and tests, including lamin fragments, fibronectin, aquaporin-2, 2-dimensional electrophoresis, epidermal growth factor, interleukin-6, monocyte chemoattractant protein-1, and glutathione S-transferases should be improved and studied further. 3) Urinary biomarkers that estimate the magnitude of renal interstitial injury must be identified and should be incorporated into standard test batteries after appropriate validation. 4) The establishment of a DNA/ renal tissue bank should be investigated to facilitate assay validation. 5) Whenever possible, a standard panel of urinary biomarkers should be incorporated in protocols for either experimental or clinical studies of acute renal failure. 6) The contribution of commonly used drugs with known or suspected nephrotoxic potential to hasten the rate of progression of pre-existing renal insufficiency should be evaluated. 7) Workshop participants should identify those forms of chronic, progressive renal injury for which there is sufficient data and opportunity to develop a protocol to study the correlation between deteriorating renal function and urinary biomarkers. 8) Three clinical conditions are candidates for studies: a) lead and cadmium exposure, b) cyclosporine and tacrolimus (FK-506) treatment, and c) cisplatin therapy.
Renal disease is an increasing problem in the United States. It is not easily treatable when diagnosed at end-stage renal disease; but in many cases the onset of clinical symptoms can be delayed or prevented if diagnosed early in the disease progression by removal from toxic exposure, and aggressive treatment of diabetes, hypertension and elevated lipids. Sensitive biomarkers allow early detection of damage to the kidney and the workshop supports the research effort to define the role of biomarkers in the detection of the early stages of disease progression.

This international conference developed recommendations for further studies into urinary biomarkers of nephrotoxicity. These recommendations will be used to shape new studies. These studies, in turn, will generate new information relating to renal disease that can be used in the U.S.

Laboratory Standardization

A LS/SAB lead scientist participated in several international conferences. The first of these was in Canada and included the review of continuing progress in and establishing plans for future progress in clinical laboratory growth. The second was held in Switzerland for the development of international standards to improve standardization and provide guidance in the field of laboratory medicine and in vitro diagnostic testing, which includes such things as quality management, pre-and post-analytical procedures, analytical performance, laboratory safety, reference systems and quality assurance. The third meeting was held in Singapore in which the scientist presented a keynote address on cholesterol standardization.

Collaborations in international meetings helps NCEH leverage its experiences and expertise at the global level. International standardization of laboratory measurements helps all countries, including the U.S. to compare results with other studies in the world.

Osteoporosis

International activity is part of CDC's bone marker standardization project. Measurements of biochemical bone markers are used for the assessment and treatment of osteoporosis and other metabolic bone diseases. Bone marker tests are reimbursed by health care organizations. Due to lack of standards, reference materials and sample collection and treatment procedures, the comparability of results obtained by different laboratories is very limited.

This project is aimed to increase the comparability of results obtained by different laboratories and methods, and therefore to enhance the clinical performance of these markers. It is primarily focused on the compounds pyridinoline and deoxypyridinoline as biochemical bone markers.

In order to assess the impact of various pre-analytical factors like lifestyle, diseases, and the conditions of the sample collection, storage and treatment, a working group with international specialists in this area was created in December, 1997 with CDC as leader and coordinator.

The goal of this working group will be to publish recommendations for minimizing pre-analytical variation on pyridinoline and deoxypyridinoline testing. These recommendation will be included in CDC's bone marker standardization program and can be adapted by other organizations working on similar issues.

The development and standardization of biochemical bone markers will impact public health in the U.S. This project is aimed to increase the comparability of results obtained by different laboratories and methods, and therefore to enhance the clinical performance of these markers. The goal of this working group will be to publish recommendations for minimizing pre-analytical variation on pyridinoline and deoxypyridinoline testing. These recommendation will be included in CDC's bone marker standardization program and can be adapted by other organizations working on similar issues. The results of this working group will improve the knowledge and understanding of these markers and will allow the efficient and cost effective use of these biomarkers in the U.S.

FY 98 NCEH Global Publications

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